ORDER NO. SD7809-1442

Service Manual

ST-9038

QUARTZ Synthesizer FM Stereo Tuner

ST-9038

(E), (XE), (XGF)
(XGH), (XA), (X)

* The model ST-9038 (E) is available in Scandinavia and European only.
* The model ST-9038 (XE) is available in United Kingdom only.
* The model ST-9038 (XGF) is available in France only.
* The model ST-9038 (XGH) is available in Holland only.
* The models ST-9038 (XA) and ST-9038 (X) are available in Asia, Latin America, Middle East and Africa only.

TECHNICAL SPECIFICATIONS

Specifications are subject to change without notice for further improvement.

(DIN 45 500)

Frequency range	87.6 ~ 107.9 MHz
Sensitivity (±40 kHz deviation)	1.2 μV (IHF, usable)
	20 μV (IHF, S/N 46 dB, 75Ω, STEREO)
	1.2 μV (S/N 30 dB, 75Ω)
	1.1 μV (S/N 26 dB, 75Ω)
	1.0 μV (S/N 20 dB, 75Ω)
Total harmonic distortion (1 kHz)	
MONO	0.1%
STEREO	0.15%
S/N (±40 kHz deviation)	
MONO	72 dB (IHF, 75 dB)
Frequency response	20 Hz ~ 18 kHz, +0.1 –0.5 dB
Selectivity	75 dB
Capture ratio	1.0 dB
Image rejection at 98 MHz	95 dB
IF rejection at 98 MHz	105 dB
Spurious response rejection at 98 MHz	105 dB
AM suppression	55 dB
Stereo separation	
1 kHz	45 dB
10 kHz	35 dB
Leak carrier	
19 kHz	–60 dB (–65 dB, IHF)
Channel balance (250 Hz ~ 6300 Hz)	±0.5 dB
Limiting point	1.0 μV
Bandwidth IF amplifier	250 kHz
FM demodulator	1000 kHz
Antenna terminals	75Ω (Unbalanced)

GENERAL

Output voltage	0 ~ 1.5 V
Power consumption	12 W
Power supply	50 Hz/60 Hz, 110 V/120 V/220 V/240 V
Dimensions (W x H x D)	450 x 53 x 293 mm
	(17-23/32" x 2-3/32" x 11-17/32")
Weight	5.9 kg (13.0 lb.)

TECHNISCHE DATEN

Spezifikationen können infolge von Verbesserungen ohne Ankündigung geändert werden

(DIN 45 500)

Empfangsbereich	87.6 ~ 107.9 MHz
Empfindlichkeit (±40 kHz Hub)	1.2 μV (IHF)
	20 μV (IHF, 46 dB Fremdspannungsabstand, 75Ω, STEREO)
	1.2 μV (30 dB Fremdspannungsabstand, 75Ω)
	1.1 μV (26 dB Fremdspannungsabstand, 75Ω)
	1.0 μV (20 dB Fremdspannungsabstand, 75Ω)
Harmonische Verzerrung (1 kHz)	
MONO	0.1%
STEREO	0.15%
Fremdspannungsabstand (±40 kHz Hub)	
MONO	72 dB (IHF, 75 dB)
Frequenzgang	20 Hz ~ 18 kHz +0.1 –0.5 dB
Selektivität	75 dB
Gleichwellen-Selektion	1.0 dB
Spiegelselektion bei 98 MHz	95 dB
ZF-Festigkeit bei 98 MHz	105 dB
Selektivitätsunfestigkeit bei 98 MHz	105 dB
AM-Unterdrückung	55 dB
Stereo-Übersprechdämpfung	
1 kHz	45 dB
10 kHz	35 dB
Trägerrest	
19 kHz	–60 dB (65 dB, IHF)
Kanalabweichung (250 Hz ~ 6300 Hz)	±0.5 dB
Begrenzungseinsatzpunkt	1.0 μV
Bandbreite ZF-Verstärker	250 kHz
UKW-Demodulator	1000 kHz
Antennenanschluß	75Ω (unsymmetrisch)

ALLGEMEINE DATEN

Ausgangsspannungen	0 ~ 1.5 V
Leistungsaufnahme	12 W
Netzspannung, umschaltbar	50 Hz/60 Hz,
	110 V/120 V/220 V/240 V
Abmessungen (B x H x T)	450 x 53 x 293 mm
Gewicht	5.9 kg

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

CARACTERISTIQUES TECHNIQUES

Sujet à changement sans préaris.

(DIN 45 500)

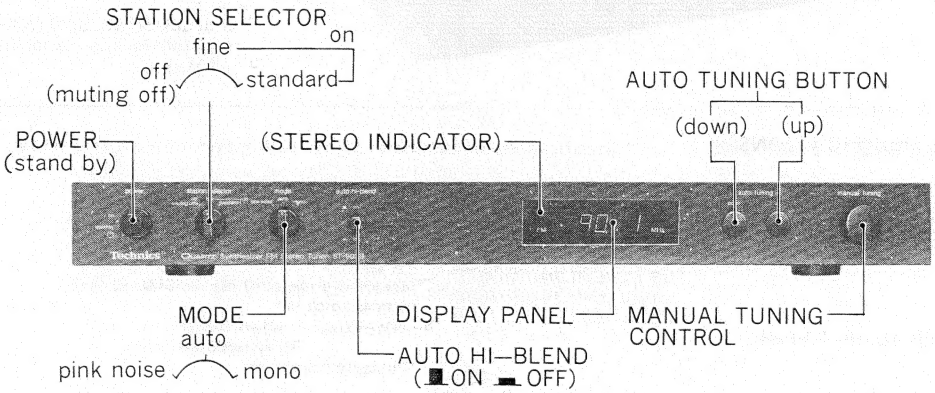
Gamme de fréquences	87.6 ~ 107.9 MHz
Sensibilite (±40 k Hz déviation)	1.2 μV (IHF, utilisable)
	20 μV (IHF, Signal/bruit 46 dB, 75 Ω, STEREO)
	1.2 μV (Signal/Bruit 30 dB, 75 Ω)
	1.1 μV (Signal/bruit 26 dB, 75 Ω)
	1.0 μV (Signal/bruit 20 dB, 75 Ω)
Distorsion harmonique totale (1 kHz)	
MONO	0.1%
STEREO	0.15%
Signal/Bruit (±40 kHz déviation)	
MONO	72 dB (IHF, 75 dB)
Résponse de fréquence	20 Hz ~ 18 kHz, +0.1 −0.5 dB
Sélectivité alternée par-canal	75 dB
Taux de capture	1.0 dB
Rejet d'image (à 98 MHz)	95 dB
Rejet FI (à 98 MHz)	105 dB
Rejet de réponse parsite (à 98 MHz)	105 dB
Suppression AM	55 dB
Séparation stéréophonique	
1 kHz	45 dB
10 kHz	35 dB

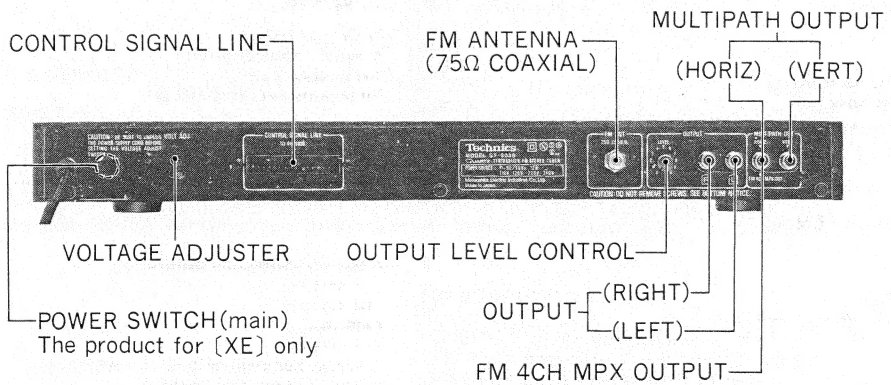
Courant porteur de dispersion	
19 kHz	−60 dB (−65 dB, IHF)
Equilibrage de canaux (250 Hz ~ 6300 Hz)	±0.5 dB
Point limite	1.0 μV
Largeur de bande	
Amplificateur FI	250 kHz
Démodulateur FM	1000 kHz
Impédance d'antenne	75 Ω (asymétrique)

GENERALITES

Tension de sortie	0 ~ 1.5 V
Consommation	12 W
Alimentation	50 Hz/60 Hz, 110 V/120 V/220 V/240 V
Dimensions (L x H x Pr)	450 x 53 x 293 mm
Poids	5.9 kg

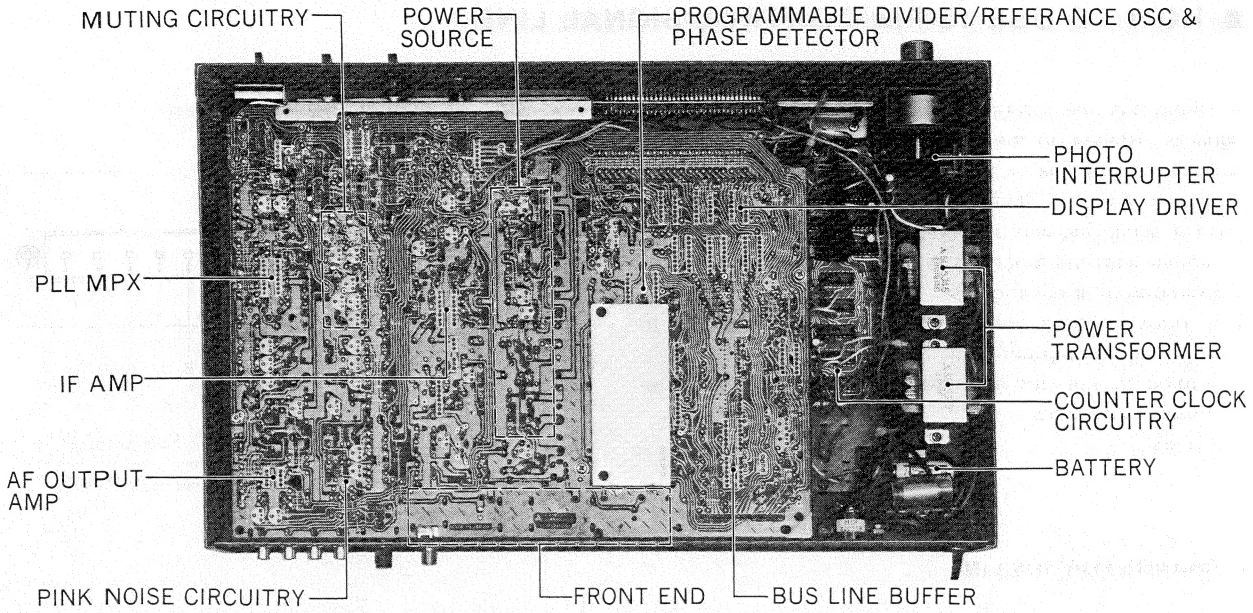
■ LOCATION OF CONTROLS





CONTENTS

LOCATION OF CONTROLS 2
HOW TO USE 16-PIN CONTROL SIGNAL LINE 4
BLOCK DIAGRAM. 5
ALIGNMENT INSTRUCTIONS (ENGLISH) 6
ALIGNMENT POINTS. 7
ANWEISUNGEN FUR ABGLEICHUNG (DEUTSCH) . . . . 8 - 9
INSTRUCTIONS D'ALIGNMENT (FRANÇAIS). . . . . 9 - 10
HOW TO REMOVE THE PRINTED-CIRCUIT BOARD 11
REPLACEMENT PARTS LIST (Electric Parts) . . . . . 12 - 14
PRINTED CIRCUIT BOARD (Counter Clock Circuitry) . . . 15
TERMINAL GUIDE 16
PRINTED CIRCUIT BOARD (Front End Circuitry) 16
PRINTED CIRCUIT BOARD (Pre Scaler Circuitry) 16
PRINTED CIRCUIT BOARD
(Power Supply, Tuner, Programmable & Display circuitry) . . . . . 17 - 18
SCHEMATIC DIAGRAM
(Counter Clock Circuitry) . . . . . 19 - 21
BLOCK DIAGRAM OF IC. . . . . 19 - 21
SCHEMATIC DIAGRAM
(Programmable & Display Circuitry) . . . . . 22 - 24
SCHEMATIC DIAGRAM
(Tuner & Power Supply Circuitry) . . . . . 25 - 27
EXPLODED VIEWS . . . . . 28 - 29
REPLACEMENT PARTS LIST
(Cabinet and Chassis parts) 30
CHANGE FROM TENTATIVE SERVICE MANUAL 31
ACCESSORIES 31
PACKINGS 32
MOUNTING IN AN ELA-STANDARD RACK 32
USE OF UNIT "FEET" 32



● Muting switch/station selector (station selector)

This switch is used to remove the "between-station noise" characteristic of the FM broadcast band, and to select the input signal strength to the tuner.

"fine":

At this position, broadcast signals with a stereo distortion ratio of 0.2% or less can be received.

Broadcasts can be automatically tuned by simply pressing one of the automatic-tuning buttons.

At this position, the broadcast signals indicated by (d) and (f) in the figure below would be received.

"standard":

At this position, broadcast signals with a stereo distortion ratio of 1% or less can be received.

Operation is the same as for the "fine" position.

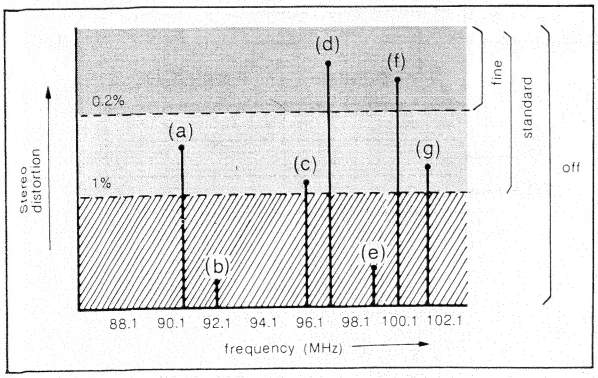
At this position, the broadcast signals indicated by (a), (c), (d), (f) and (g) in the figure below would be received.

"off":

At this position, all FM broadcast signals are received. Set to this position when it is desired to receive even weak signals with a stereo distortion ratio of more than 1%.

Note that the muting function is off at this position, and therefore the volume control should be set to a low level for tuning.

In addition, although this is the "muting off" position, the muting will function during tuning, becoming off when the tuning is stopped.



● Mode selector (mode)

The mode selector is used to change reception conditions and to select the "pink-noise" generator used for adjustment of the recording level, etc.

"pink noise":

When set to this position, "pink noise" will be emitted from the output terminals ("OUTPUT").

When a flat frequency response is indicated by the meters, the modulation level is set for 50% modulation.

For recording-level adjustment:

- Using VU (level) meters
  Adjust so that the indication needles show a reading of about −6 VU (−6 dB)
- Using peak-level meters
  Adjust so that the indication needles show a reading of about +3 dB.
  Because the optimum value is apt to vary according to the program source and the tape deck, adjustment of the recording level should be made by taking such factors into consideration.

"auto":

Stereo broadcasts will automatically be received as stereo, and monaural broadcasts will be received manaurally.

"mono":

All broadcasts, stereo and monaural, will always be received manaurally.

● Automatic high-blend switch (auto hi-blend)

When this switch is set to the "on" position, the high-blend circuitry will function automatically, turning on and off depending upon the strength of the input signal.

The switch is off when pressed inward (▬—▬), and on when released outward (▬—▬).

The high-blend circuitry operates to reduce noise, without acoustically disturbing the stereo effect, by mixing the left and right high-frequency range, where noise is relatively more irritating to the ear.

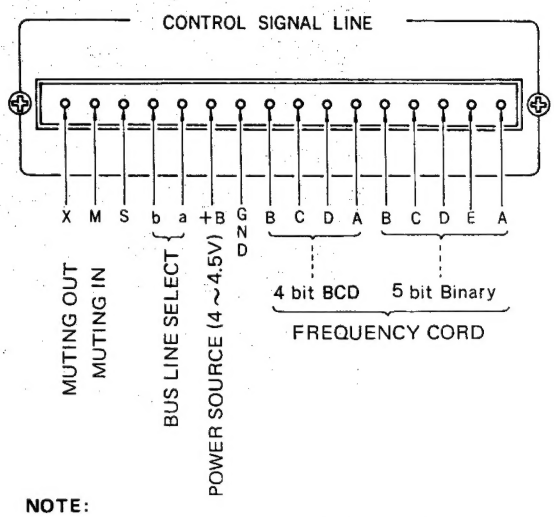
■ HOW TO USE 16-PIN CONTROL SIGNAL LINE

A 16-pin bus line (Control Signal Line) for system control signal is installed on the rear side of this unit. The original purpose of this line is to control the signals between the programmable unit (SH-9038) and this tuner. However, the control signal line will offer various applications if the user is familiar with the functions as mentioned below;

< Examples of applications >

1) Various controls are possible, connecting the line to your micro-computer.
2) Tuning to the desired broadcasting station can be remotely controlled.
3) Others

• SIGNAL FOR 16-PIN BUS LINE



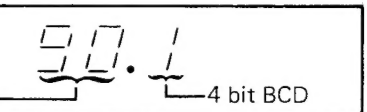
NOTE:

- When controlling frequency with external signal, be sure to set Bus Line to "Ext."
  Bus line is very strong against destruction because of its open collector system, but it should not be short-circuited with power source.
- Terminal "S" is sensitive to noise.

• CHANGE FOR BUS LINE

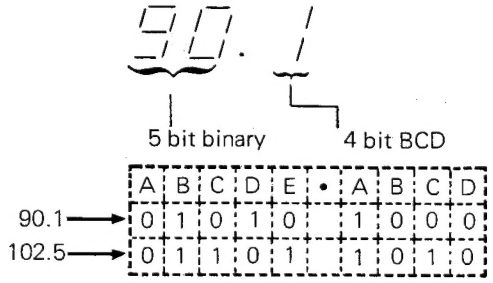
a	b	Bus Line	
0	0	Ext.	Frequency control with external signal
1	0	Ext.	
0	1	Ext.	
1	1	Int.	Frequency control with internal signal

• RECEIVING FREQUENCY & FREQUENCY CORD

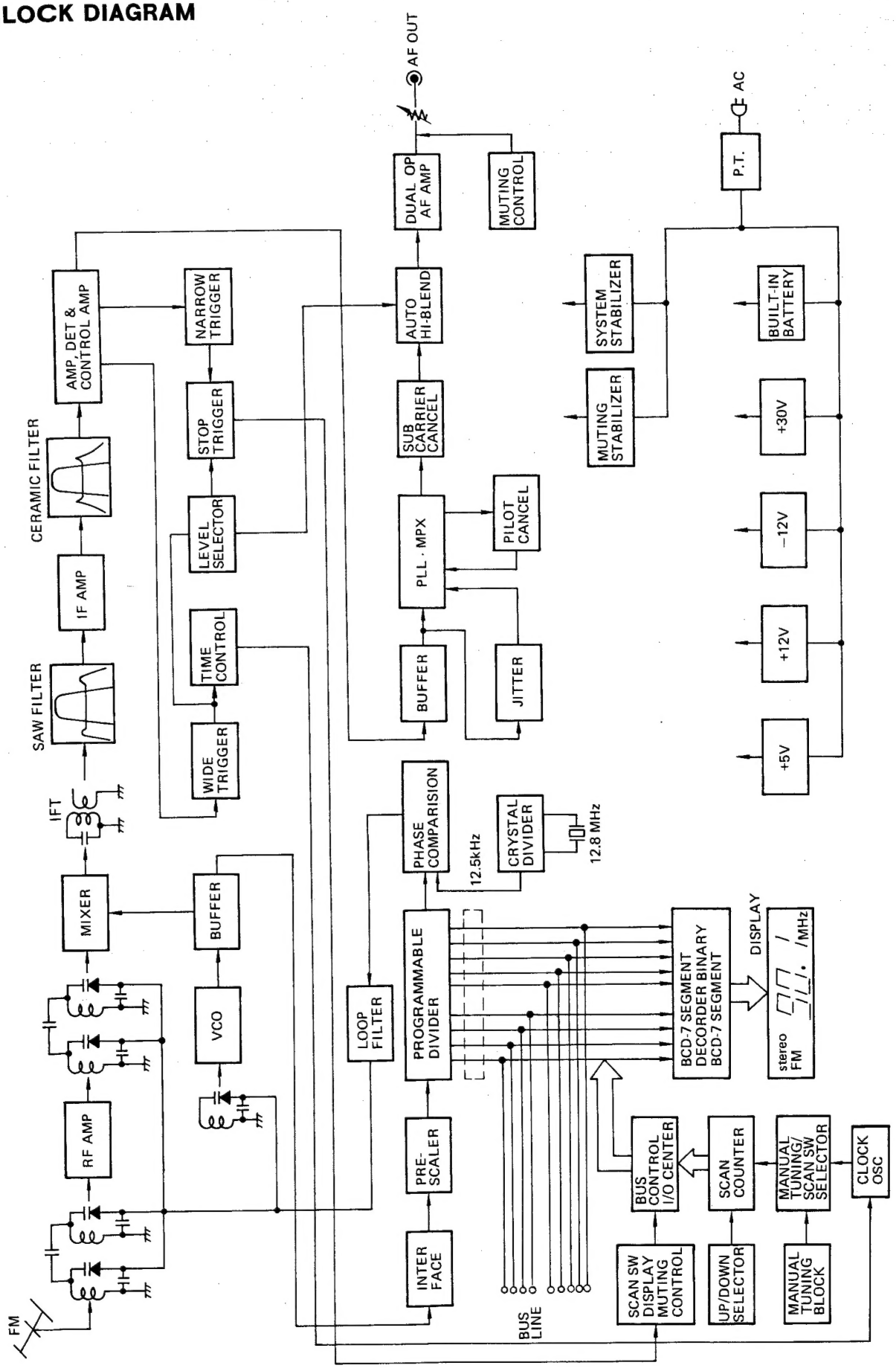


		A	B	C	D	E		A	B	C	D
87		1	1	1	0	0	0	0	0	0	0
88		0	0	0	1	0	1	1	0	0	0
89		1	0	0	1	0	2	0	1	0	0
90		0	1	0	1	0	3	1	1	0	0
91		1	1	0	1	0	4	0	0	1	0
92		0	0	1	1	0	5	1	0	1	0
93		1	0	1	1	0	6	0	1	1	0
94		0	1	1	1	0	7	1	1	1	0
95		1	1	1	1	0	8	0	0	0	1
96		0	0	0	0	1	9	1	0	0	1
97		1	0	0	0	1					
98		0	1	0	0	1					
99		1	1	0	0	1					
100		0	0	1	0	1					
101		1	0	1	0	1					

		A	B	C	D	E
102		0	1	1	0	1
103		1	1	1	0	1
104		0	0	0	1	1
105		1	0	0	1	1
106		0	1	0	1	1
107		1	1	0	1	1



■ BLOCK DIAGRAM



-9038

ALIGNMENT INSTRUCTIONS — ENGLISH

Equipment used

1. FM signal generator (FM-SG)
2. Stereo modulator (or separation meter)
3. Distortion gauge
4. Oscilloscope
5. AC and DC electronic voltmeters (VTVM)
6. Frequency counter (19 kHz and 108 MHz measurable)
7. FM 75Ω dummy antenna (Fig. 1) and low-pass filter (Fig. 2)

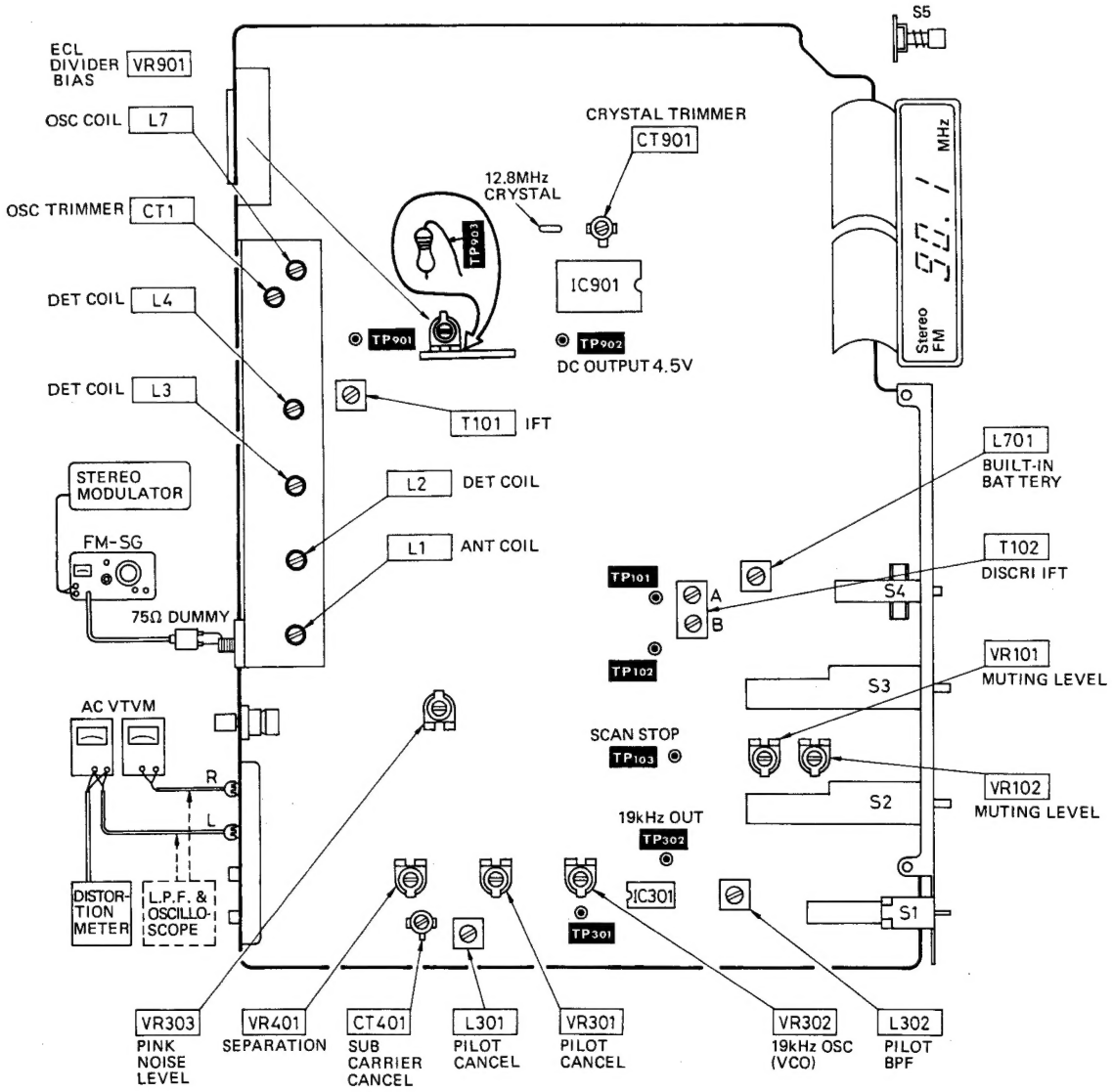
Preparation of FM signal generator (FM-SG)

1. Connect stereo modulator to FM-SG.
2. Apply SG output to antenna terminal of the set through 75Ω FM dummy antenna.
3. The standard input of the set is 60 dB (1mV), 400 Hz 100% modulation (Because of using dummy antenna, SG output must be 12 dB plus [IHF]. That is, when input is 60 dB, SG output is to be 72 dB.)

Step	Circuit	Preparations	Parts adjusted	Adjusting procedure
1	Local oscillation frequency	1) Set station selector switch to "off" and push tuning button so that frequency indication is 97.0 MHz. 2) Connect frequency counter between TP901 and earth.	CT901 (Crystal OSC trimmer)	1) Set VR901 to control point.(Center Position) 2) Adjust CT901 so that frequency counter indicates 107.7 ±0.001MHz.
2	Intermediate frequency (IF)	1) Set station selector switch to "off" and push tuning button so that frequency indication is 98.1MHz. 2) Connect DC.voltmeter between TP101 and TP102.	T102 (A) (DISCRI IFT)	Adjust T102 (A) core so that voltage measured in no signal mode is 0V in 300mV range.
3	High frequency 87.6 MHz	1) Turn CT1 up to around center. 2) Set station selector switch to "off" and push tuning button so that frequency indication is 87.6 MHz. 3) Connect DC voltmeter (or tester) between TP902 and earth.	CT1 (OSC trimmer) L7 (OSC coil)	Adjust L7 so that voltage measured by DC voltmeter (or tester) is 4.5V.
4	High frequency 89.1MHz	1) Set station selector switch to "off" and push turning button so that frequency indication is 89.1MHz. 2) Add 89.100 ±0.005MHz to the set with use of SG. 3) Connect AC voltmeter and oscilloscope to output terminals of the set.	L1 (ANT coil) L2, 3,4 (DETcoil) T101 (IFT)	1) Adjust L1, L2, L3 and L4 repeatedly so that AF output from output terminal becomes maximum. 2) Adjust T101 so that output wave form becomes vertically symmetrical. (Fig. 3)
5	High frequency 104.1MHz	1) Get 104.1MHz indication in the same manner as in step 4. 2) Add 104.100 ±0.005MHz to the set with use of SG.	CT1 (OSC trimmer)	1) Adjust CT1 so that output is maximum as in step 4. 2) Repeat the adjustments in steps 3 ~ 5 a few times. 3) Conduct the adjustment in step 2 once again.
6	Mono distortion	1) Get 98.1MHz indication in the same manner as in step 4. 2) Add 98.100 ±0.002MHz, 400Hz 100% modulation "standard signal" to the set with use of SG. 3) Connect DC voltmeter between TP101 (–) and TP102 (+). 4) Connect distortion meter to output terminals of the set.	T102 (A) T102 (B) (DISCRI IFT)	1) Adjust T102 (A) core so that voltage between TP101 and TP102 is +50mV in 300mV range. 2) Adjust T102 (B) core so that distortion of right and left channels is minimized 3) Again make the adjustments in 1 and 2.
7	SCAN STOP (fine)	1) Get 98.1MHz indication in the same manner as in step 4. 2) Add 98.100 ±0.005MHz, 400Hz 100% modulation, 35 dB signal to the set. 3) Set station selector switch to "fine". 4) Connect oscilloscope or AC VTVM to output terminal.	VR101	Fully turn VR101 clockwise and then slowly turn it counterclockwise until output is gained.
8	SCAN STOP (standard)	1) Add 20 dB signal to the set in the same manner as in step 7. 2) Set station selector switch to "standard".	VR102	Fully turn VR102 clockwise and then slowly turn it counterclockwise until output is gained.
9	ECL DIVIDER BIAS	1) Add 98.100 ±0.005MHz, 400Hz 100% modulation, 60 dB signal to the set. 2) Connect DC VTVM to TP903 through choke coil (SLQAN40G1).	VR901	1) Fully turn VR901 counterclockwise and then slowly turn it clockwise until output is gained. Then measure voltage (voltage 1) at that point. 2) Next, fully turn VR901 clockwise and then slowly turn it counterclockwise until output is gained. Then measure voltage (voltage 2) at that point. 3) Average the voltage values obtained in 1 and 2. 4) Adjust VR901 so that the calculated voltage is obtainable.
10	PLL VCO	1) Set mode switch to "auto". 2) Add 98.100 ±0.005MHz, 400Hz 30% modulating 60 dB signal to the set. 3) Connect frequency counter to TP302 through 100 kilohms resistor.	VR302 (19kHz OSC)	Adjust VR302 so that TP302 output frequency is 19.00 ±0.03kHz.
11	Pilot band-pass filter	1) Add 98. 100 ±0.005MHz, 400 Hz (L–R) 98%, Pilot 10% modulation, 60 dB stereo signal to the set. 2) Connect AC VTVM to output terminal of the set through low-pass filter (Fig. 2) 3) Connect distortion meter to Lch output terminal of the set.	L302 (Pilot BPF)	1) Adjust L302 so that output voltage is maximum. 2) Shift OUTPUT MODE of stereo modulator from (L–R) to (L). 3) Re-adjust L302 so that distortion of Lch is minimized. 4) Distortion of Rch should be nearly the same as Lch.
12	Pilot cancel	1) Add 98.1 ±0.005MHz, Pilot 10% modulation, 60 dB stereo non-modulation signal to the set. 2) Connect AC VTVM to TP301.	VR301 L301 (Pilot cancel)	Alternately adjust VR301 and L301 so that TP301 output is minimized.

Step	Circuit	Preparations	Parts adjusted	Adjusting procedure
13	Subcarrier cancel	1) Same as 1 in step 12. 2) Connect VTVM to output terminal. (Do not connect through low-pass filter.)	CT401 (Subcarrer cancel)	Adjust CT401 so that output is minimized.
14	Separation	1) Add 98.100 ±0.005MHz, 1kHz, 30%, Pilot 10% modulation, 60 dB stereo signal to the set. 2) Connect AC VTVM to output terminal of the set.	VR401 (Separation)	Adjust VR401 so that R output is minimized when stereo modulator is in L (Lch modulation) mode and that L output is minimized in R mode.
15	Pink noise level	1) Add 98.1 ±0.005MHz, 400Hz (L + R) 90%, Pilot 10% modulation, 60 dB stereo signal to the set. 2) Connect AC VTVM to Lch output terminal.	VR303 (Pink noise)	1) Output voltage should be 0 dB when mode switch is at "auto". 2) With mode switch set at "pink noise", adjust VR303 so that output is the initially obtained output minus 6 dB.

■ ALIGNMENT POINTS



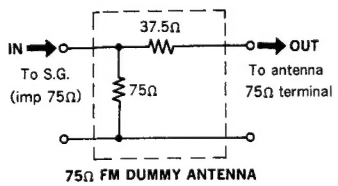


Fig. 1

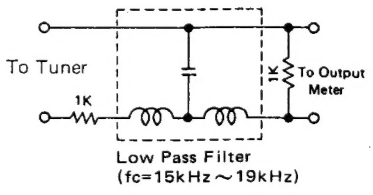


Fig. 2

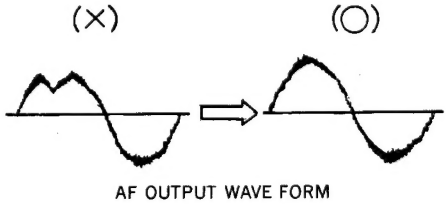


Fig. 3

■ ANWEISUNGEN FÜR ABGLEICHUNG — DEUTSCH

Verwendete Einrichtungen
1. UKW-Meßsender (FM-SG)
2. Stereo-Modulator (oder Trennmesser)
3. Verzerrungsmesser
4. Oszilloskop
5. Elektronische Voltmeter für Wechsel- und Gleichstrom (VTVM)
6. Signalfrequenzmesser (meßbar für 19 kHz und 108 MHz)
7. UKW 75 Ohm Kunstantenne (Fig. 1) und Tiefpaßfilter (Fig. 2)

Vorbereitung AM UKW-Messender (FM-SG)
1. Stereo-Modulator an FM-SG anschließen.
2. SG-Ausgang über 75-Ohm UKW Kunstantenne an den Antenneneingang des Gerätes schließen.
3. Der normale Eingang des Gerätes beträt 60 dB (1 mV), 400 Hz 100% Modulation. (Wegen Verwendung der Kunstantenne muß der Signalausgang 12 dB plus (IHF) sein: d.h. beim Eingang von 60 dB soll der Signalausgang 72 dB sein.)

Schritt	Kreis	Vorbereitung	Abgleichspunkte	Abgleichsverfahren
1	Überlagerungs-frequenz	1) Stationswähler auf "off" stellen und Abstimmknopf drücken, so daß Frequenz von 97,0 MHz angezeigt wird. 2) Zwischen TP901 und Erdung Signal-frequenzmesser schließen.	CT901 (Kristallpszil-lationstrimmer)	1) VR901 auf die Mitte einstellen. 2) CT901 so abgleichen, daß Signalfrequenz-messer 107,7 ±0,001 MHz anzeigt.
2	Zwischen-frequenz (IF)	1) Stationswähler auf "off" stellen und Abstimmknopf drücken, so daß Frequenz von 98,1 MHz angezeigt wird. 2) Zwischen TP101 und TP102 Gleichstrom-Voltmeter schließen.	T102 (A) (DISCRI IFT)	Den Kern von T102 (A) so justieren, daß die gemessene Spannung im signallosen Modus 0 V im 300 mV Bereich beträgt.
3	Hochfrequenz (87.6 MHz)	1) CT1 bis zur Mitte drehen. 2) Stationswähler auf "off" stellen und Abstimmknopf drücken, so daß Frequenz von 87,6 MHz angezeigt wird. 3) Zwischen TP902 und Erdung Gleichstrom-Voltmeter (oder Prüfgerät) schließen.	CT1 (OSC Trimmer) L7 (OSC Spule)	L7 so justieren, daß die vom Gleichstrom-Voltmeter (oder Prüfgerät) gemessene Spannung 4,5 V beträgt.
4	Hochfrequenz (89,1 MHz)	1) Stationswähler auf "off" stellen und Abstimmknopf drücken, so daß Frequenz von 89,1 MHz angezeigt wird. 2) Unter Verwendung on SG das Gerät auf 89,100 ± 0,005 MHz einstellen. 3) An Ausgangsklemmen des Gerätes Wech-selstrom-Voltmeter und Oszilloskop schließen.	L1 (ANT Spule) L2, L3, L4 (DET Spule) T101 (IFT)	1) L1, L2, L3 und L4 wiederholt abgleichen, so daß AF-Ausgang aus der Ausgangsklemme maximal wird. 2) T101 so abgleichen, daß Ausgangswel-lenform vertikal symmetrisch wird. (Fig. 3)
5	Hochfrequenz (104,1 MHz)	1) In der gleichen Weise wie bei Schritt 4 auf 104,1 MHz einstellen. 2) Unter Verwendung von SG das Gerät auf 104,100 ± 0,005 MHz einstellen.	CT1 (OSC Trimmer)	1) CT1 so abgleichen, daß Ausgang wie bei Schritt 4 maximal wird. 2) Justierung in Schritt 3 - 5 ein paar Mal wiederholen. 3) Justierung in Schritt 2 noch einmal vornehmen.
6	Mono-Verzerrung	1) In der gleichen Weise wie bei Schritt 4 auf 98,1 MHz einstellen. 2) Unter Verwendung von SG das Gerät auf 98,100 ± 0,002 MHz, 400 Hz 100% Modulation "Standardsignal" einstellen. 3) Zwischen TP101(—) und TP102 (+) Gleichstrom-Voltmeter schließen. 4) Verzerrungsmesser an rechten und linken Kanäle Ausgangsklemme des Gerätes schließen.	T102 (A) T102 (B) (DISKRI IFT)	1) T102 (A) Kern so justieren, daß die Spannung zwischen TP101 und TP102 +50 mV im 300 mV Bereich beträgt. 2) T102 (B) Kern für minimale Verzerrung der rechten und linken Kanäle justieren. 3) Justierungen (1) und (2) wieder vornehmen.
7	Abtastaus-schaltung (fine)	1) In der gleichen Weise wie bei Schritt 4 auf 98,1 MHz einstellen. 2) Das Gerät auf 98,100 ± 0,005 MHz, 400 Hz 100% Modulation, 35 dB Signal einstellen. 3) Stationswähler auf "fine" stellen. 4) Oszilloskop oder Wechselstrom-VTVM an Ausgangsklemme schließen.	VR101	VR101 im Uhrzeigersinn voll drehen, dann im Gegensinn zum Uhrzeiger langsam zurückdrehen, bis Ausgangsleistung gewonnen wird.
8	Abtastaus-schaltung (standard)	1) In gleicher Weise wie bei Schritt 7 das Gerät auf 20 dB Signal einstellen. 2) Stationswähler auf "standard" stellen.	VR102	VR102 im Ihrzeigersinn voll drehen, dann im Gegensinn zum Uhrzeiger langsam zurückdrehen, bis Ausgangsleistung gewonnen wird.
9	ECL-Verteiler Vorspannung	1) Das Gerät auf 98,100 ± 0,005 MHz, 400 Hz 100% Modulation, 60 dB Signal einstellen. 2) Über Schutzdrossel (SLQAN40G1) Gleichstrom-VTVM an TP903 schließen.	VR901	1) VR901 im Gegensinn zum Uhrzeiger voll drehen, dann im Uhrzeigersinn langsam zurückdrehen, bis Ausgangsleistung gewonnen wird. Dann an dem Punkt Spannung (Spannung 1) messen. 2) Anschließend VR901 im Uhrzeigersinn voll drehen, dann im Gegensinn zum Uhrzeiger langsam zurückdrehen, bis Ausgangsleistung gewonnen wird. 3) Von den in (1) und (2) ermittelten Spannungswerten das Mittel bilden. 4) VR901 so abgleichen, daß die berechnete Spannung erzielt wird.
10	PLL VCO	1) Mode-Schalter auf "auto" stellen. 2) Das Gerät auf 98,100 ±0,005 MHz, 400 Hz 30% Modulation 60dB Signal einstellen. 3) Über 100 kOhm Signalfrequenz-messer an TP302 schließen.	VR302 (19kHz OSC)	VR302 so abgleichen, daß Ausgangsfrequenz von TP302 19,00 ± 0,03 kHz beträgt.

Schritt	Kreis	Vorbereitung	Abgleichspunkte	Abgleichsverfahren
11	Kontroll-Bandpaßfilter	1) Das Gerät auf 98,100 ± 0,005 MHz, 400 Hz (L—R) 90%, Pilot 10% Modulation, 60 dB Stereosignal einstellen. 2) Tiefpaßfilter (Fig. 2) über Wechselstrom-VTVM an Ausgangsklemme des Gerätes schließen. 3) Verzerrungsmesser an Linkskanal-Ausgangsklemme des Gerätes schließen.	L302 (Pilot BPF)	1) L302 so abgleichen, daß Ausgangsspannung maximal wird. 2) OUTPUT MODE des Stereomodulator von (L—R) auf (L) umschalten. 3) L302 für minimale Verzerrung des Linkskanals wieder abgleichen. 4) Verzerrung des Rechtskanals soll annähernd gleich wie bei Linkskanal sein.
12	Kontroll-auflösen	1) Das Gerät auf 98,100 ± 0,005 MHz, Pilot 10% Modulation, 60 dB Stereo nichtmoduliertes Signal einstellen. 2) Wechselstrom-VTVM an TP301 schließen.	L301 VR301 (Kontrollauflösung)	VR301 und L301 abwechselnd so abgleichen, daß TP301-Ausgang aufs kleinste Maß verringert wird.
13	Hilfsträger-auflösung	1) Gleich wie (1) in Schritt 12. 2) VTVM an Ausgangsklemme schließen. (nicht über Tiefpaßfilter anschließen.)	CT401 (Hilfsträger-auflösung)	CT401 auf minimale Anzeige des Ausgangs abgleichen.
14	Trennung	1) Das Gerät auf 98,100 ± 0,005 MHz, 1 kHz 30%, Pilot 10% Modulation, 60 dB Stereosignal einstellen. 2) Wechselstrom-VTVM an Ausgang-sklemme des Gerätes schließen.	VR401 (Trennung)	VR401 auf minimale Anzeige des R-Ausgangs bei Stereomodulator in L-(L-Kanalmodulation) Modus, und auf minimale Anzeige des L-Ausgangs in R-Modus abgleichen.
15	Pink-noise-Pegel	1) Das Gerät auf 98,100 ± 0,005 MHz, 400 Hz (L+R) 90%, Pilot 10% Modulation, 60 dB Stereosignal einstellen. 2) Wechselstrom-VTVM an L-Kanal-Ausgangsklemme schließen.	VR303 (Pink noise)	1) Ausgangsspannung muß 0 dB sein, wenn Mode-Schalter auf "auto" gestellt ist. 2) Mode-Schalter auf "pink noise" stellen, VR303 so abgleichen, daß der Ausgang 6 dB weniger als der am Anfang gewonnene Ausgang ist.

Anmerkungen : Batterie
1. Unmittelbar nach Anschaffung des Gerätes ist es möglich, daß sich die Batterie schon entladen haben.
2. Die Batterie wird stets aufgeladen, wenn der Stöpsel nicht herausgezogen ist, gleich, ob der Hauptschalter ausgeschaltet ist. (Wenn der Stöpsel für Stromquelle auch herausgezogen sein mag, der Speicherkreis arbeitet bei voller Aufladung für 3 Wochen.
3. Die Batterie darf nie kurzgeschlossen werden.
4. Bei Erneuerung der Batterie muß eine nachladbare Batterie (No. NRAAE-1) verwendet werden.

■ INSTRUCTIONS D'ALIGNEMENT — FRANÇAIS

Equipment utilisé
1. Générateur du signal FM (FM-SG).
2. Commande de réglage stéréophonique (ou vu-mètre de séparation).
3. Jauge de distorsion.
4. Oscilloscope.
5. Voltmètres électronique de courant alternatif et de courant continu (VTVM).
6. Compteur de fréquence (19kHz et 108MHz mesurable).
7. Antenne fictive FM, 75 ohms (Fig. 1) et filtre passe-bas (Fig. 2).

Préparation du générateur de signal FM (FM-SG)
1. Brancher la commande de réglage stéréophonique à FM-SG.
2. Alimenter la sortie SG à la borne de l'antenne de l'appareil, par l'antenne fictive FM, 75 ohms.
3. L'entrée standard de l'appareil est de 60dB (1mV), 400Hz, 100% de modulation (à cause de l'utilisation de l'antenne fictive, la sortie SG doit être de plus 12dB (IHF). Ce qui signifie que quand l'entrée est de 60 dB, la sortie SG doit être de 72dB.)

Etape	Circuit	Préparations	Eléments réglés	Procédure de réglage
1	Fréquence d'oscillation locale	1) Régler le commutateur de sélection de la station sur "off" et pousser le bouton de commande d'accord de telle sorte que l'indication de la fréquence soit de 97,0 MHz. 2) Brancher le compteur de fréquence entre TP901 et la prise de terre.	CT901 (Trimmer OSC á cristal)	1) Régler VR901 au point de contrôle. 2) Régler CT901 de telle sorte que le compteur de fréquence indique 107,7 ±0,001MHz.
2	Fréquence intermédiaire (IF)	1) Régler le commutateur de sélection de la station sur "off" et pousser le bouton de commande d'accord de telle sorte que la fréquence indique 98,1 MHz. 2) Brancher le voltmètre à courant continu entre TP101 et TP102.	T102(A) (DISCRI IFT)	Régler le noyau T102 (A) de telle sorte que le voltage mesuré dans le mode sans signal, soit de 0 V dans la gamme des 300mV.
3	Haute fréquence (87,6 MHz)	1) Tourner le CT1 approximativement sur la position centrale. 2) Régler le commutateur de sélection de la station sur "off" et pousser le bouton de commande d'accord de telle sorte que l'indication de la fréquence soit de 87,6 MHz. 3) Brancher le voltmètre à courant continu (ou le testeur) entre TP902 et la prise de terre.	CT1 (trimmer OSC) L7 (bobine OSC)	Régler L7 de telle sorte que le voltage mesuré par le voltmètre à courant continu (ou le testeur), soit de 4,5V.
4	Haute fréquence (89,1 MHz)	1) Régler le commutateur de sélection de la station sur "off" de telle sorte que l'indication de la fréquence soit de 89,1 MHz. 2) Ajouter 89,100 ±0,005 MHz au réglage en utilisant SG. 3) Brancher le voltmètre à courant alternatif et l'oscilloscope aux bornes de sortie de l'appareil.	L1 (Bobine ANT) L2, L3, L4 (Bobine DET) T101 (IFT)	1) Régler L1, L2, L3, et L4 consécutivement, de telle sorte que la sortie AF venant de la borne de sortie, devienne maximale. 2) Régler T101 de telle sorte que la forme d'l'onde de sortie devienne symétriquement verticale. (Fig. 3)
5	Haute fréquence (104,1 MHz)	1) Recevoir l'indication 104,1 MHz de la même façon que dans l'étape 4. 2) Ajouter 104,100 ± 0,005 MHz au réglage par l'utilisation de SG.	CT1 (Trimmer OSC)	1) Régler CT1 de telle sorte que la sortie soit maximale comme dans l'étape 4. 2) Refaire les réglage des étapes 3 à 5, plusieurs fois. 3) Effectuer une nouvelle fois, le réglage de l'étape 2.

Etape	Circuit	Préparations	Eléments réglés	Procédure de réglage
6	Distorsion monophonïque	1) Recevoir l'indication 98,1 MHz de la même façon que dans l'étape 4. 2) Ajouter 98,100 ± 0,002 MHz, 400 Hz 100% de modulation "signal standard" au réglage en utilisant SG. 3) Brancher le volmètre à courant continu entre TP101 (—) et TP102 (+). 4) Brancher le compteur de distorsion à la borne de sortie du canal gauche et droit de l'appareil.	T102 (A) T102 (B) (DISCRI IFT)	1) Régler le noyau T102 (A) de telle sorte que le voltage entre TP101 et TP102 soit de +50mV dans la gamme de 300mV. 2) Régler le noyau T102 (B) de telle sorte que la distorsion des canaux droit et gauche soit la plus faible 3) Refaire de nouveau les réglages de 1 et 2.
7	SCAN STOP (arrêt de balayage) (fine)	1) Recevoir une indication de 98,1 MHz de la même façon que dans l'étape 4. 2) Ajouter 98,100 ± 0,005 MHz, 400 Hz 100% de modulation, un signal de 35dB l'appareil. 3) Placer le commutateur de sélection de la station sur "fine" (fin). 4) Brancher l'oscilloscope ou le voltmètre à courant alternatif à la borne de sortie.	VR101	Tourner complètement VR101 à droite et ensuite le tourner doucement à gauche jusqu'à ce que la sortie soit établie.
8	SCAN STOP (standard)	1) Ajouter un signal de 20dB au réglage de la même façon que dans l'étape 7. 2) Régler le commutateur de sélection de station sur "standard".	VR102	Tourner complètement VR102 à droite et ensuite le tourner doucement à gauche jusqu'à ce que la sortie soit établie.
9	Repartiteur ELC Polarisation	1) Ajouter 98,100 ± 0,005 MHz, 400 Hz 100% de modulation, un signal de 60 dB à l'appareil. 2) Brancher le voltmètre à TP903 par l'intermédiaire d'une bobine à etranglement (SLQAN40G1).	VR901	1) Tourner complètement VR901 à gauche et ensuite doucement à droite jusqu'à ce que la sortie soit établie. Puis, mesurer le voltage (voltage 1) à cet endroit. 2) Tourner complètement VR901 à droite et ensuite lentement vers la gauche jusqu'à ce que la sortie soir établie. Puis mesurer le voltage (voltage 2) à cet endroit. 3) Faire la moyenne des valeurs de voltage obtenues dans 1 et 2. 4) Régler VR901 de telle sorte que le voltage calculé puisse être obtenu.
10	PLL VCO	1) Régler le commutateur de mode sur "auto". 2) Ajouter 98,100 ± 0,005 MHz, 400 Hz, signal de 60 dB de modulation, l'appareil. 3) Brancher le compteur de fréquence à TP302 par 100Kohms.	VR302 (19kHz OSC)	Régler VR302 de telle sorte que la fréquence de sortie de TP302 soit de 19,00 ±0,03 kHz.
11	Filtre pilote passe-bande	1) Ajouter 98,100 ± 0,005 MHz, 400 Hz (Gauche-droit) 90%, modulation pilote 10%, signal stéréophonique 60 dB, à l'appareil. 2) Brancher le filtre passe-bas (Fig. 2) à la borne de sortie de l'appareil par un voltmètre à courant alternatif. 3) Brancher le compteur de distorsion à la borne de sortie du canal gauche de l'appareil.	L302 (BPF signal pilote)	1) Régler L302 de telle sorte que le voltage de sortie soit maximum. 2) Déplacer le OUTPUT MODE (commutateur de sortie) de la commande de réglage stéréophonique, de (G—D) à (G). 3) Re-régler L302 de telle sorte que la distorsion du canal gauche (G) soit minimale. 4) La distorsion du canal droit doit être pratiquement la même que celle du canal gauche.
12	Annulation du signal pilote	1) Ajouter 98,100 ± 0,005 MHz, modulation du signal pilote 10%; signal de non-modulation stéréophonique 60dB, à l'appareil. 2) Brancher un voltmètre à courant alternatif à TP301.	VR301 L301 (Annulation du signal pilote)	Régler alternativement VR301 et L301 de telle sorte que la sortie de TP301 soit minimale.
13	Annulation de l'onde porteuse (subcarrier)	1) Comme 1 de l'étape 12. 2) Brancher le voltmètre à la borne de sortie. (Ne pas brancher par le filtre passe-bas.)	CT401 (annulation du subcarrier)	Régler CT401 de telle sorte que la sortie soit minimale.
14	Séparation	1) Ajouter 98,100 ± 0,005 MHz, 1 kHz, Modulation pilote 10%, signal stéréophonique 60 dB, à l'appareil. 2) Brancher le voltmètre à courant alternatif à la borne de sortie de l'appareil.	VR401 (séparation)	Régler VR401 de telle sorte que la sortie droite soit minimale quand la commande d'accord stéréophonique est dans le mode gauche (modulation du canal gauche) et que la sortie gauche soit minimale dans mode droit.
15	Niveau de bruit de cliquetis (Pink noise)	1) Ajouter 98,100 ± 0,005 MHz, 400 Hz (G + D) 90%, modulation du signal pilote 10%, signal stéréophonique 60 dB, à l'appareil. 2) Brancher un voltmètre à courant continu à la borne de sortie du canal gauche.	VR303 (pink noise)	1) Le voltage de sortie doit être de 0 dB quand le commutateur de mode est sur "auto". 2) Quand le commutateur de mode est réglé sur "pink noise", régler VR303 de telle sorte que la sortie soit la sortie initialement obtenus moins 6 dB.

Note : Batterie incorporée

1. Tout de suite après avoir acheté l'appareil, il se peut que la batterie soit déchargée.
2. La batterie est chargée tout le temps, sauf si l'appareil est débrancher de la prise murale sans tenir compte du commutateur d'alimentation. (Même quand l'appareil est débranché de la prise d'alimentation sur secteur, la mémoire du circuit fonctionne pendant 3 semaines si la batterie est complètement chargée.)
3. La batterie ne doit jamais être mise en court-circuit.
4. Lors du remplacement de la batterie, s'assurer d'utiliser une batterie rechargeable (No.: NRAAE-1).

■ HOW TO REMOVE THE PRINTED-CIRCUIT BOARD AND BOTTOM BOARD

How to Remove Bottom Board and Printed Circuit Board

1. Turn the set upside down, then remove the 6 setscrews fastening the bottom board. (Fig. 1: 1 ~ 6).
2. Remove the 3 setscrews on the rear panel (Photo 2: 7 ~ 9). Then the bottom board can be removed.
3. Remove the 4 setscrews fastening the printed circuit board. (Photo 1: 1 ~ 4)
4. Remove the 2 setscrews on the rear panel. (Photo 2: 5 ~ 6)
5. The frequency indication plate is pressed against the front panel by spring as in Fig. 2. Therefore, first press down the frequency indication plate as in Fig. 3.
6. Next, shift it a little backward as in Fig. 4, and then pull it upward as in Fig. 5. Thus, the frequency indication plate can be removed.
7. The printed circuit board can be removed from the chassis along with the rear panel and front knobs.

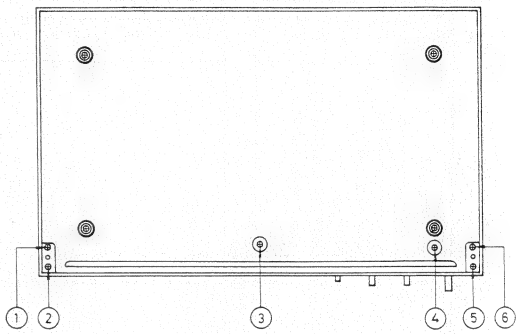


Fig. 1

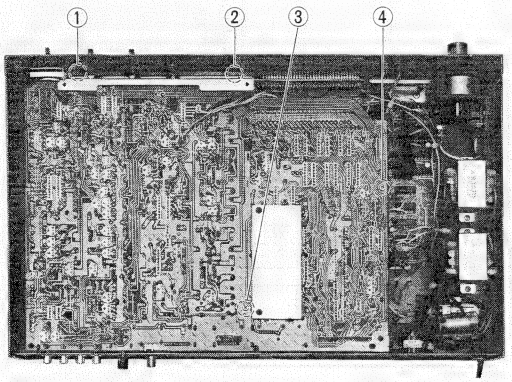


Photo 1

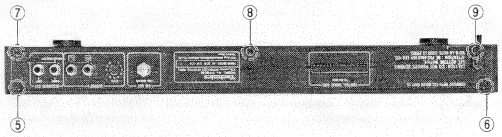


Photo 2

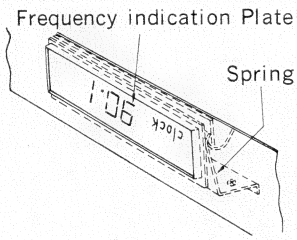


Fig. 2

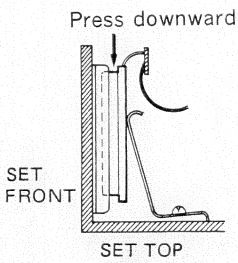


Fig. 3

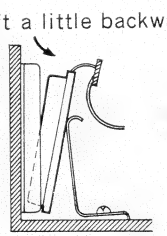


Fig. 4

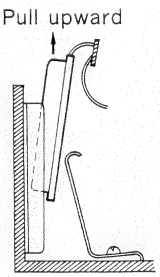


Fig. 5

NOTE:

Built-in battery

1. Soon after buying the unit, you may find the built-in battery has been discharged.
2. The battery is charged at all times unless the set is disconnected from AC outlet irrespective of the power switch. (Even when the set is disconnected from AC outlet, the memory circuit will work for 3 weeks if the battery is completely charged.)
3. The battery should never be shortcircuited.
4. When replacing the battery, be sure to sure to use a rechargeable battery (NO: NRAAE-1).

■ REPLACEMENT PARTS LIST ... Electric Parts

NOTES 1:
1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. [S] indicates that only parts specified by the manufacturer be used for safety.

Ref. No.		Part No.	Part Name & Description	Per Set		Remarks
INTEGRATED CIRCUITS						
IC101		AN278	IC, IF Amplifier	1		
IC102		AN377	IC, IF Amplifier & Detector	1		
IC301		AN363	IC, FM Multiplex	1		
IC401		SVIUPC4558C	IC, AF Amplifier	1		
IC901		SVIMC10131P	IC, Pre Scaler	1		○
IC902		SVISN74LS76	IC, Pre Scaler	1		
IC903		SVISN74LS192	IC, Programmable Divider	1		
IC904		SVISN74LS74	IC, Programmable Divider	1		
IC905		SVISN74LS32	IC, OR Circuit	1		
IC906		SVISN74LS08	IC, AND Circuit	1		
IC907		SVIUPD861C	IC, Programmable Divider, Phase Detector & Reference Oscillator	1		
IC908, 909		SVISN74LS03	IC, Bus Line Buffer	2		
IC912		SVISN74LS00	IC, Clock Control	1		
IC913		SVISN74185	IC, Code Converter	1		
IC914, 915		SVISN74LS47	IC, 7 Segment Decoder	2		
IC916, 917, 918		SVISN7406	IC, Driver (Inverter)	3		
IC919, 923		SVISN74LS08	IC, AND Circuit	2		
IC920, 922		SVISN74LS00	IC, HAND Circuit	2		
IC921		SVISN74LS221	IC, One Shot Multivibrator	1		○
IC924, 926		SVIUPD4049C	IC, Inverter	2		
IC925, 927		SVIUPD4029C	IC, Programmable Up-Down Counter	2		○
IC928		SVIUPD4027C	IC, J.K Flipflop	1		○
TRANSISTORS						
TR1		3SK40-L	Transistor (FET), RF Amplifier	1		
TR2, 3		2SC1674-M	Transistor, Mixer & Local Oscillator	2		
TR4		2SK49-H1	Transistor (FET), Buffer	1		
TR101		**2SC829-C**	Transistor, IF Amplifier (Use in ranks C or C1)	1		
TR103~106, 109~113, 115~117		**2SC945-R**	Transistor, AGC & Switching (Use in ranks R or P1)	12		
TR114		2SA733-P1	Transistor, Switching	1		
TR301~308, 402, 403		**2SC945-R**	Transistor, 19kHz Amplifier, 19kHz Buffer, Pink-Noise Oscillator & Switching (Use in ranks R or P1)	10		
TR401		2SK104-H	Transistor (FET), High-Blend Switching (Use in ranks H or J)	1		
TR701		**2SC1384A-Q**	Transistor, Regulator (Use in ranks Q or R)	1		
TR702, 704, 708		**2SC945-R**	Transistor, Regulator & DC-DC Converter (Use in ranks R or P1)	3		
TR703		2SD571-L	Transistor, Regulator	1		
TR705		2SC1913-Q	Transistor, Regulator (Use in ranks P, Q or R)	1		
TR706		2SA913-P	Transistor, Regulator (Use in ranks P, Q or R)	1		
TR707		2SA733-P1	Transistor, Regulator	1		
TR901, 902		2SC1674-M	Transistor, Local Amplifier	2		
TR903~906		**2SC945-R**	Transistor, Low Pass Filter & Bus Line Buffer (Use in ranks R or P1)	4		
TR908		2SA733-P1	Transistor, Clock Generator	1		
TR909, 910		**2SC945-R**	Transistor, Clock Generator & Step Stopper (Use in ranks R or P1)	2		
DIODES						
D1~5		MA320G1-N	Diode, Varactor	5		
D101, 102, 103, 106, 107, 109, 114, 115		MA150	Diode, AGC & Switching	8		
D104, 105, 111, 112		OA99	Diode	4		
D108		OA95	Diode, Switching	1		
D301		SVDKB262E	Diode, Bias Supply	1		
D701~706, 708, 709	[S]	**SM112**	Rectifier	8		
D707		MA1064A	Diode, 6V Zener	1		
D710, 711		MA150	Diode	2		
D712		OA99	Diode	1		
D901~904, 915~917, 921, 923, 927, 929, 930		MA150	Diode	12		
D905~908, 918~920, 922 928, 951~967, 969~972		OA99	Diode	30		
PHOTO INTERRUPTERS						
M901, 902		ON1102	Photo Interrupter, Manual Tuning	2		○
COILS and TRANSFORMERS						
L1		SLA4N11-P	Coil, Antenna	1		
L2, 4		SLD4N19-P	Coil, Antenna & RF Detector	2		
L3		SLD4N21-P	Coil, RF Detector	1		
L5		**RLQY15G5**	Coil, Choke	1		
L6		**SLQAN40G-1**	Coil, Choke	1		
L7		SL04N19-P	Coil, Oscillator	1		○
L101		SLQW180-1K	Coil, Choke	1		
L301, 302		SLM1C37-Z	Coil, 19kHz	2		
L401		SLQW204-1Z	Coil, Choke	1		
L701		RLI2C450-M	Coil, DC-DC Converter	1		
T101		SLIA4C101-Z	Transformer, IF	1		
T102		SLI4D513-Z	Transformer, IF	1		
T701, 702	[S]	SLT5J45	Transformer, Power Source	1		○
CERAMIC FILTERS						
CF101		SVFF107MC1-A	SAW Filter, 10.7MHz	1		
CF102		SVFE107MM-A	Ceramic Filter, 10.7MHz	1		
CF103		SVFE107ML-A	Ceramic Filter, 10.7MHz	1		

Ref. No.		Part No.	Part Name & Description	Per Set		Remarks
CRYSTAL						
X901		SVQ43U1282	Crystal, 12.8 MHz	1		
DISPLAY PANEL						
LT901		SAD7MT-06	Display Panel, Indication	1		
VARIABLE RESISTORS						
VR101, 102, 301 303, 401		**EVLS3AA00B54**	Muting Level, Pilot B.P.F. Pink Noise Level & Separation Adjustment, 50 kΩ(B)	5		
VR302		EVTS3AA00B14	V.C.O. Adjustment, 10 kΩ(B)	1		
VR402, 403		EWKG7A024A14	Output Level Control, 10 kΩ(B)	1		
VR901		EVMHOGA00B14	ECL Divider Bias Adjustment, 10kΩ(B)	1		
VARIABLE CAPACITORS						
CT1		ECV1ZW06X40	Trimmer, Local Oscillator	1		
CT401		ECV1ZW30X32	Trimmer, Sub Carrier Cancel	1		
CT901		ECV1ZW06X35	Trimmer, Crystal Oscillator Correction	1		
THERMISTERS						
TH101		ERTD2FHL103S	Thermister	1		
TH901		ERTD2FHK202S	Thermister	1		
COMPONENT COMBINATIONS						
Z701~704		EXRFS203ZS	Component Combination, Noise Killor	4		
SWITCHES						
S1	S	SSL79	Switch, Power	1		
S2, 3		SSR89	Switch, Muting & Selector	2		
S4		SSH83	Switch, High-Blend	1		
S701	S	ESE372	Switch, Voltage Adjuster	1		
S702 (XE) only	S	ESB70133	Switch, Main Power	1		
S901, 902		EVQPDR11K	Switch, Step Scan	2		
FUSE						
F1 (E, XGF, XGH, X, XA)		XBA2C06TR0	Fuse, T630mA (250V) (The product for [XE] is not provided.)	1		

NOTES 2:

Guide letters of Resistor and Capacitor indicate;

Resistors
- ERD . . . . Carbon
- ERO . . . . Metal film
- ERQ . . . . Fuse type metallic

Capacitors
- ECC . . . . . Ceramic
- ECG . . . . . Ceramic
- ECQS . . . . . Polyestylene
- ECN . . . . . Paper
- ECK . . . . . Ceramic
- ECE . . . . . Electrolytic
- ECQM . . . Polyester

No. 1

Ref. No.	Part No.	
RESISTORS		
R1, 2	**ERD25TJ104**	
R3, 4	**ERD25TJ104**	
R5	**ERD25TJ101**	
R6, 7	**ERD25TJ470**	
R8, 9	**ERD25TJ104**	
R10	**ERD25TJ822**	
R11	**ERD25TJ333**	
R12	**ERD25TJ332**	
R13	**ERD25TJ333**	
R14	**ERD25TJ563**	
R15	**ERD25TJ222**	
R16	**ERD25TJ104**	
R17	**ERD25TJ102**	
R101	**ERD25TJ153**	
R102	**ERD25TJ152**	
R103	**ERD25TJ331**	
R104	**ERD25TJ101**	
R105	**ERD25TJ331**	
R106	**ERD25TJ471**	
R107	**ERD25TJ151**	
R108	**ERD25TJ102**	
R109	**ERD25TJ331**	
R110	**ERD25TJ272**	
R111	**ERD25TJ222**	
R112	**ERD25TJ682**	
R113	**ERD25TJ331**	
R114	**ERD25TJ102**	
R115	**ERD25TJ271**	
R116	**ERD25TJ104**	
R117	**ERD25TJ103**	
R118	**ERD25TJ470**	
R119	**ERD25TJ392**	
R120	**ERD25TJ562**	
R121	**ERD25TJ104**	
R122	**ERD25TJ183**	
R123	**ERD25TJ222**	

No.2

Part No.	Ref. No.	
R124	**ERD25TJ103**	
R125	**ERD25TJ104**	
R127	**ERD25TJ563**	
R129	**ERD25TJ103**	
R131	**ERD25TJ154**	
R133	**ERD25TJ103**	
R135	**ERD25TJ103**	
R136, 137	**ERD25TJ103**	
R138	**ERD25TJ104**	
R139	**ERD25TJ473**	
R140	**ERD25TJ124**	
R141	**ERD25TJ104**	
R142	**ERD25TJ683**	
R143	**ERD25TJ184**	
R144	**ERD25TJ332**	
R145	**ERD25TJ102**	
R146	**ERD25TJ104**	
R147, 148	**ERD25TJ473**	
R149	**ERD25TJ224**	
R150	**ERD25TJ683**	
R151	**ERD25TJ103**	
R152	**ERD25TJ102**	
R153	**ERD25TJ333**	
R155, 156	**ERD25TJ103**	
R159	**ERD25TJ824**	
R160	**ERD25TJ821**	
R162	**ERD25TJ103**	
R163	**ERD25TJ104**	
R164	**ERD25TJ563**	
R301	**ERD25TJ332**	
R302	**ERD25TJ683**	
R303	**ERD25TJ103**	
R304	**ERD25TJ472**	
R305	**ERD25TJ274**	
R306	**ERD25TJ563**	
R307	**ERD25TJ103**	

No. 3

Ref. No.	Part No.	
R308	**ERD25TJ272**	
R309	**ERD25TJ223**	
R310	**ERD25TJ562**	
R311	**ERD25TJ392**	
R312	**ERD25TJ153**	
R313	**ERD25TJ103**	
R314	**ERD25TJ223**	
R315	**ERD25TJ104**	
R316	**ERD25TJ332**	
R317, 318	**ERD25TJ101**	
R319	**ERD25TJ153**	
R320	**ERD25TJ102**	
R321	**ERD25TJ474**	
R323, 324	ERQ25CKG4701	
R325, 326	ERQ25CKG4702	
R327	**ERD25TJ473**	
R328	**ERD25TJ273**	
R329	**ERD25TJ103**	
R330	**ERD25TJ472**	
R331	**ERD25TJ222**	
R332	**ERD25TJ682**	
R333	**ERD25TJ222**	
R334	**ERD25TJ681**	
R335	**ERD25TJ221**	
R336	**ERD25TJ124**	
R337	**ERD25TJ822**	
R338	**ERD25TJ472**	
R339	**ERD25TJ101**	
R340	**ERD25TJ472**	
R341	**ERD25TJ104**	
R342	**ERD25TJ103**	
R343	**ERD25TJ153**	
R401	**ERD25TJ124**	
R402	**ERD25TJ824**	
R403, 404	**ERD25TJ222**	
R405, 406	**ERD25TJ104**	
R407, 408	**ERD25TJ472**	
R409, 410	**ERD25TJ473**	
R411, 412	**ERD25TJ103**	
R413, 414	**ERD25TJ332**	
R415	**ERD25TJ103**	
R701	ERD12FJ220	S
R702	**ERD25TJ561**	
R704	**ERD25TJ472**	
R705	**ERD25TJ122**	
R706	**ERD25TJ822**	
R707	**ERD25TJ332**	
R708	**ERD25TJ392**	
R709	**ERD25TJ472**	
R710	**ERD18FJ2R2**	
R711	ERD12FJ220	S
R712	**ERD18FJ2R2**	S
R713	ERQ12HJ2R2	S
R714	**ERD25TJ102**	
R715	**ERD25TJ221**	
R716	ERD12FJ220	S

No.4

Ref. No.	Part No.	
R717	**ERD25TJ122**	
R718	**ERD25TJ221**	
R719	**ERD25TJ392**	
R720	**ERD25TJ472**	
R721	**ERD18FJ2R2**	S
R722	**ERD25TJ221**	
R723	**ERD25TJ223**	
R724	**ERD25TJ563**	
R901, 902	**ERD25TJ153**	
R904	**ERD25TJ391**	
R905	**ERD25TJ273**	
R906	**ERD25TJ102**	
R907	**ERD25TJ272**	
R909	**ERD25TJ681**	
R910	**ERD25TJ102**	
R911	**ERD25TJ332**	
R912	**ERD25TJ683**	
R913, 914	**ERD25TJ103**	
R915	**ERD25TJ682**	
R917	**ERD25TJ334**	
R918, 919	**ERD25TJ562**	
R920, 921	**ERD25TJ333**	
R922	**ERD25TJ333**	
R923, 924	**ERD25TJ333**	
R925	**ERD25TJ392**	
R926	**ERD25TJ333**	
R927	**ERD25TJ392**	
R928	**ERD25TJ333**	
R929	**ERD25TJ680**	
R930, 931	**ERD25TJ103**	
R932	**ERD25TJ103**	
R933, 934	**ERD25TJ333**	
R935	**ERD25TJ331**	
R936	**ERD25TJ681**	
R937	**ERD50TJ155**	
R938	**ERD25TJ223**	
R939	**ERD25TJ563**	
R940, 941	**ERD25TJ103**	
R942	**ERD25TJ103**	
R943	**ERD25TJ183**	
R944, 945	**ERD25TJ563**	
R946, 947	**ERD25TJ563**	
R948, 949	**ERD25TJ563**	
R950, 951	**ERD25TJ563**	
R952, 953	**ERD25TJ563**	
R954, 955	**ERD25TJ563**	
R956, 957	**ERD25TJ563**	
R958	**ERD25TJ223**	
R959, 960	**ERD25TJ563**	
R961	**ERD25TJ563**	
R962	**ERD25TJ223**	
R963	**ERD25TJ562**	
R964	**ERD25TJ223**	
R965	**ERD25TJ333**	
R966	ERD12FJ560	S
R967	**ERD25TJ102**	

No.5

Ref. No.	Part No.	
R968	**ERD25TJ680**	
R969	**ERD25TJ224**	
R970	**ERD25TJ103**	
R972	**ERD25TJ470**	
R973, 974	**ERD25TJ562**	
R975, 976	**ERD25TJ272**	
R978	**ERD25TJ681**	
R979	**ERD25TJ123**	
R981, 982	**ERD25TJ331**	
R983, 984	**ERD25TJ103**	
R985, 986	**ERD25TJ563**	
R988	**ERD25TJ152**	
R989	**ERD25TJ563**	
R990	**ERD25TJ154**	
R991	**ERD25TJ393**	
R992, 993	**ERD25TJ104**	
R994	**ERD25TJ683**	
R995	**ERD25TJ393**	
R996	**ERD25TJ564**	
R997	**ERD25TJ272**	
R999	**ERD25TJ103**	
CAPACITORS		
C1	ECCD1H050CC	
C2	ECKD1H102MDA	
C3	ECGN5R22K	
C4	ECKD1H102MDA	
C5, 6	ECCD1H050CC	
C7	ECKD1H102MDA	
C8	ECKD1H223ZF	
C10	ECCD1H050CC	
C11	ECKD1H102MDA	
C12	ECGN5R22K	
C13	ECKD1H102MDA	
C14	ECCD1H050CC	
C15	ECCD1H040CC	
C16	ECCD1H181K	
C17	ECCD1H020CC	
C18	ECKD1H102ZF	
C19	ECKD1H223ZF	
C20	ECKD1H102MDA	
C21	ECCD1H070DC	
C22	ECCD1H390KC	
C23	ECCD1H070DC	
C25	ECCD1H120KC	
C26, 27	ECKD1H102ZF	
C28	ECCD1H100KC	
C29, 30	ECKD1H102MDA	
C31	ECKD1H223ZF	
C101	ECKD1H102ZF	
C102, 103	ECKD1H223ZF	
C104	ECCD1H101K	
C105	**ECEA1ES470**	
C106, 107	ECKD1H223ZF	
C108, 109	ECKD1H103ZF	
C110, 111	ECKD1H223ZF	

No. 6

Ref. No.	Part No.	
C112, 113	ECKD1H223ZF	
C114	**ECEA1JS4R7**	
C115	ECCD1H680K	
C116	ECKD1H223ZF	
C117	**ECEA2AS010**	
C118	**ECEA1ES470**	
C119, 120	ECKD1H223ZF	
C121	**ECEA2AS010**	
C122	ECKD1H103ZF	
C124	**ECEA50Z2R2**	
C126	**ECEA2AS010**	
C127	**ECEA1CS221**	
C128	**ECEA1AS221**	
C129	**ECEA1HS100**	
C130	**ECEA1CS330**	
C131	**ECEA2AS010**	
C133	ECKD1H223ZF	
C134	**ECEA1CS330**	
C135	**ECEA1ES470**	
C301	ECKD1H103ZF	
C302	ECQS05562JZ	
C303	**ECEA1HS100**	
C304, 305	ECKD1H103ZF	
C306	**ECEA1HS100**	
C307	ECQS05562JZ	
C308	ECKD1H103ZF	
C309	**ECEA1HS100**	
C310	**ECEA1ES470**	
C311	**ECEA1ES101**	
C312	ECQS05471JZ	
C313	**ECEA50MR22R**	
C314	**ECEA50MR47R**	
C315	ECKD1H103ZF	
C316	**ECEA50MR47R**	
C317	**ECEA2AS010**	
C318	**ECEA1AS470**	
C319	**ECEA50MR68R**	
C320	**ECEA50MR22R**	
C321	ECQM1H823JZ	
C322, 323	**ECEA2AS010**	
C324	**ECEA1HS100**	
C401, 402	ECQF1123GZ	
C403, 404	**ECEA2ASR47**	
C405	ECQM1H153KZ	
C406	ECQM1H273KZ	
C407	ECCD1H560KC	
C409, 410	**ECEA25N3R3**	S
C701	**ECEA1HS221**	
C702	**ECEA1ES471**	
C703	**ECEA1HS221**	
C704, 705	**ECEA1VS101**	
C706	ECKD1H103ZF	
C707	**ECEA1CS102**	
C708	**ECEA1ES471**	
C709	**ECEA1VS102**	
C710	**ECEA1CS471**	

No. 7

Ref. No.	Part No.	
C711	ECKD1H103ZF	
C712	**ECEA1AS102**	
C713	**ECEA1CS222**	
C714	**ECEA1AS471**	
C715	ECKD1H103ZF	
C716	**ECEA1CS102**	
C717, 718	**ECEA1ES471**	
C719, 720	**ECEA1CS221**	
C721	ECKD1H103ZF	
C722	ECQM1H332KZ	
C723	**ECEA1AS101**	
C724	ECNC4A103M	S
C901	ECKD1H102MD	
C903	ECKD1H222KB	
C904	ECKD1H102MD	
C905	ECKD1H223ZF	
C906	**ECEA0JS102**	
C907	ECQM1H103KZ	
C908	**ECEA50MR47R**	
C910	ECQM1H103KZ	
C911	ECQM1H223KZ	
C912	**ECEA0JS102**	
C913	**ECEA50MR1R**	
C914	ECKD1H223ZF	
C915, 916	ECQM1H333KZ	
C917	**ECEA50ZR68**	
C918	**ECEA1VS101**	
C919	ECKD1H223ZF	
C920	ECCD1H820K	
C921	ECKD1H223ZF	
C923	ECCD1H820K	
C925	ECCD1H470K	
C941, 942	**ECEA0JS102**	
C951, 952	ECKD1H223ZF	
C953	**ECEA0JS102**	
C971, 972	**ECEA50MR15R**	
C975, 976	**ECEA50Z1**	
C981, 982	**ECEA50MR22R**	
C984	ECKD1H223ZF	
C986	ECKD1H223ZF	
C987, 988	**ECEA50M2R2R**	
C989	**ECEA50ZR1**	
C991	ECKD1H103ZF	
C992	ECKD1H223ZF	
C993	ECKD1H103ZF	
C995	ECQM1H223KZ	
C997, 998	ECKD1H102MD	

No.5

Ref. No.	Part No.	
	ERD25TJ680	
	ERD25TJ224	
	ERD25TJ103	
	ERD25TJ562	
	ERD25TJ470	
74	**ERD25TJ562**	
76	**ERD25TJ272**	
	ERD25TJ681	
82	**ERD25TJ123**	
84	**ERD25TJ331**	
	ERD25TJ104	
93	**ERD25TJ683**	
	ERD25TJ393	
	ERD25TJ564	
	ERD25TJ272	
	ERD25TJ103	
	CAPACITORS	
	ECCD1H050CC	
	ECKD1H102MDA	
	ECGN5R22K	
	ECKD1H102MDA	
	ECCD1H050CC	
	ECKD1H102MDA	
	ECKD1H223ZF	
	ECCD1H050CC	
	ECKD1H102MDA	
	ECGN5R22K	
	ECKD1H102MDA	
	ECCD1H050CC	
	ECCD1H040CC	
	ECCD1H181K	
	ECCD1H020CC	
	ECKD1H102ZF	
	ECKD1H223ZF	
	ECKD1H102MDA	
	ECCD1H070DC	
	ECCD1H390KC	
	ECCD1H070DC	
	ECCD1H120KC	
7	ECKD1H102ZF	
	ECCD1H100KC	
0	ECKD1H102MDA	
	ECKD1H223ZF	
	ECKD1H102ZF	
103	ECKD1H223ZF	
	ECCD1H101K	
	ECEA1ES470	
107	ECKD1H223ZF	
109	ECKD1H103ZF	
111	ECKD1H223ZF	

No.6

Ref. No.	Part No.	
C112, 113	ECKD1H223ZF	
C114	**ECEA1JS4R7**	
C115	ECCD1H680K	
C116	ECKD1H223ZF	
C117	**ECEA2AS010**	
C118	**ECEA1ES470**	
C119, 120	ECKD1H223ZF	
C121	**ECEA2AS010**	
C122	ECKD1H103ZF	
C124	**ECEA50Z2R2**	
C126	**ECEA2AS010**	
C127	**ECEA1CS221**	
C128	**ECEA1AS221**	
C129	**ECEA1HS100**	
C130	**ECEA1CS330**	
C131	**ECEA2AS010**	
C133	ECKD1H223ZF	
C134	**ECEA1CS330**	
C135	**ECEA1ES470**	
C301	ECKD1H103ZF	
C302	ECQS05562JZ	
C303	**ECEA1HS100**	
C304, 305	ECKD1H103ZF	
C306	**ECEA1HS100**	
C307	ECQS05562JZ	
C308	ECKD1H103ZF	
C309	**ECEA1HS100**	
C310	**ECEA1ES470**	
C311	**ECEA1ES101**	
C312	ECQS05471JZ	
C313	**ECEA50MR22R**	
C314	**ECEA50MR47R**	
C315	ECKD1H103ZF	
C316	**ECEA50MR47R**	
C317	**ECEA2AS010**	
C318	**ECEA1AS470**	
C319	**ECEA50MR68R**	
C320	**ECEA50MR22R**	
C321	ECQM1H823JZ	
C322, 323	**ECEA2AS010**	S
C324	**ECEA1HS100**	
C401, 402	ECQP1123GZ	
C403, 404	**ECEA2ASR47**	
C405	ECQM1H153KZ	
C406	ECQM1H273KZ	
C407	ECCD1H560KC	
C409, 410	**ECEA25N3R3**	
C701	**ECEA1HS221**	
C702	**ECEA1ES471**	
C703	**ECEA1HS221**	
C704, 705	**ECEA1VS101**	
C706	ECKD1H103ZF	
C707	**ECEA1CS102**	
C708	**ECEA1ES471**	
C709	**ECEA1VS102**	
C710	**ECEA1CS471**	

No. 7

Ref. No.	Part No.	
C711	ECKD1H103ZF	
C712	**ECEA1AS102**	
C713	**ECEA1CS222**	
C714	**ECEA1AS471**	
C715	ECKD1H103ZF	
C716	**ECEA1CS102**	
C717, 718	**ECEA1ES471**	
C719, 720	**ECEA1CS221**	
C721	ECKD1H103ZF	
C722	ECQM1H332KZ	
C723	**ECEA1AS101**	S
C724	ECNC4A103M	
C901	ECKD1H102MD	
C903	ECKD1H222KB	
C904	ECKD1H102MD	
C905	ECKD1H223ZF	
C906	**ECEA0JS102**	
C907	ECQM1H103KZ	
C908	**ECEA50MR47R**	
C910	ECQM1H103KZ	
C911	ECQM1H223KZ	
C912	**ECEA0JS102**	
C913	**ECEA50MR1R**	
C914	ECKD1H223ZF	
C915, 916	ECQM1H333KZ	
C917	**ECEA50Z2R68**	
C918	**ECEA1VS101**	
C919	ECKD1H223ZF	
C920	ECCD1H820K	
C921	ECKD1H223ZF	
C923	ECCD1H820K	
C925	ECCD1H470K	
C941, 942	**ECEA0JS102**	
C951, 952	ECKD1H223ZF	
C953	**ECEA0JS102**	
C971, 972	**ECEA50MR15R**	
C975, 976	**ECEA50Z1**	
C981, 982	**ECEA50MR22R**	
C984	ECKD1H223ZF	
C986	ECKD1H223ZF	
C987, 988	**ECEA50M2R2R**	
C989	**ECEA50ZR1**	
C991	ECKD1H103ZF	
C992	ECKD1H223ZF	
C993	ECKD1H103ZF	
C995	ECQM1H223KZ	
C997, 998	ECKD1H102MD	

No.4

Ref. No.	Part No.	
	ERD25TJ122	
	ERD25TJ221	
	ERD25TJ392	
	ERD25TJ472	
	ERD18FJ2R2	S
	ERD25TJ221	
	ERD25TJ223	
	ERD25TJ563	
	ERD25TJ153	
	ERD25TJ391	
	ERD25TJ273	
	ERD25TJ102	
	ERD25TJ272	
	ERD25TJ681	
	ERD25TJ102	
	ERD25TJ332	
	ERD25TJ683	
	ERD25TJ103	
	ERD25TJ682	
	ERD25TJ334	
	ERD25TJ562	
	ERD25TJ333	
	ERD25TJ333	
	ERD25TJ392	
	ERD25TJ333	
	ERD25TJ392	
	ERD25TJ333	
	ERD25TJ680	
	ERD25TJ103	
	ERD25TJ103	
	ERD25TJ333	
	ERD25TJ681	
	ERD50TJ155	
	ERD25TJ223	
	ERD25TJ563	
	ERD25TJ103	
	ERD25TJ103	
	ERD25TJ183	
	ERD25TJ563	
	ERD25TJ563	
	ERD25TJ563	
	ERD25TJ563	
	ERD25TJ563	
	ERD25TJ223	
	ERD25TJ563	
	ERD25TJ563	
	ERD25TJ223	
	ERD25TJ562	
	ERD25TJ223	
	ERD25TJ333	S
	ERD12F-J560	
	ERD25TJ102	

No. 3

Ref. No.	Part No.	
R308	**ERD25TJ272**	
R309	**ERD25TJ223**	
R310	**ERD25TJ562**	
R311	**ERD25TJ392**	
R312	**ERD25TJ153**	
R313	**ERD25TJ103**	
R314	**ERD25TJ223**	
R315	**ERD25TJ104**	
R316	**ERD25TJ332**	
R317, 318	**ERD25TJ101**	
R319	**ERD25TJ153**	
R320	**ERD25TJ102**	
R321	**ERD25TJ474**	
R323, 324	ERO25CKG4701	
R325, 326	ERO25CKG4702	
R327	**ERD25TJ473**	
R328	**ERD25TJ273**	
R329	**ERD25TJ103**	
R330	**ERD25TJ472**	
R331	**ERD25TJ222**	
R332	**ERD25TJ682**	
R333	**ERD25TJ222**	
R334	**ERD25TJ681**	
R335	**ERD25TJ221**	
R336	**ERD25TJ124**	
R337	**ERD25TJ822**	
R338	**ERD25TJ472**	
R339	**ERD25TJ101**	
R340	**ERD25TJ472**	
R341	**ERD25TJ104**	
R342	**ERD25TJ103**	
R343	**ERD25TJ153**	
R401	**ERD25TJ124**	
R402	**ERD25TJ824**	
R403, 404	**ERD25TJ222**	
R405, 406	**ERD25TJ104**	
R407, 408	**ERD25TJ472**	
R409, 410	**ERD25TJ473**	
R411, 412	**ERD25TJ103**	
R413, 414	**ERD25TJ332**	
R415	**ERD25TJ103**	S
R701	ERD12F-J220	
R702	**ERD25TJ561**	
R704	**ERD25TJ472**	
R705	**ERD25TJ122**	
R706	**ERD25TJ822**	
R707	**ERD25TJ332**	
R708	**ERD25TJ392**	
R709	**ERD25TJ472**	
R710	**ERD18FJ2R2**	
R711	ERD12F-J220	S
R712	**ERD18FJ2R2**	S
R713	ERQ12HJ2R2	S
R714	**ERD25TJ102**	
R715	**ERD25TJ221**	S
R716	ERD12F-J220	

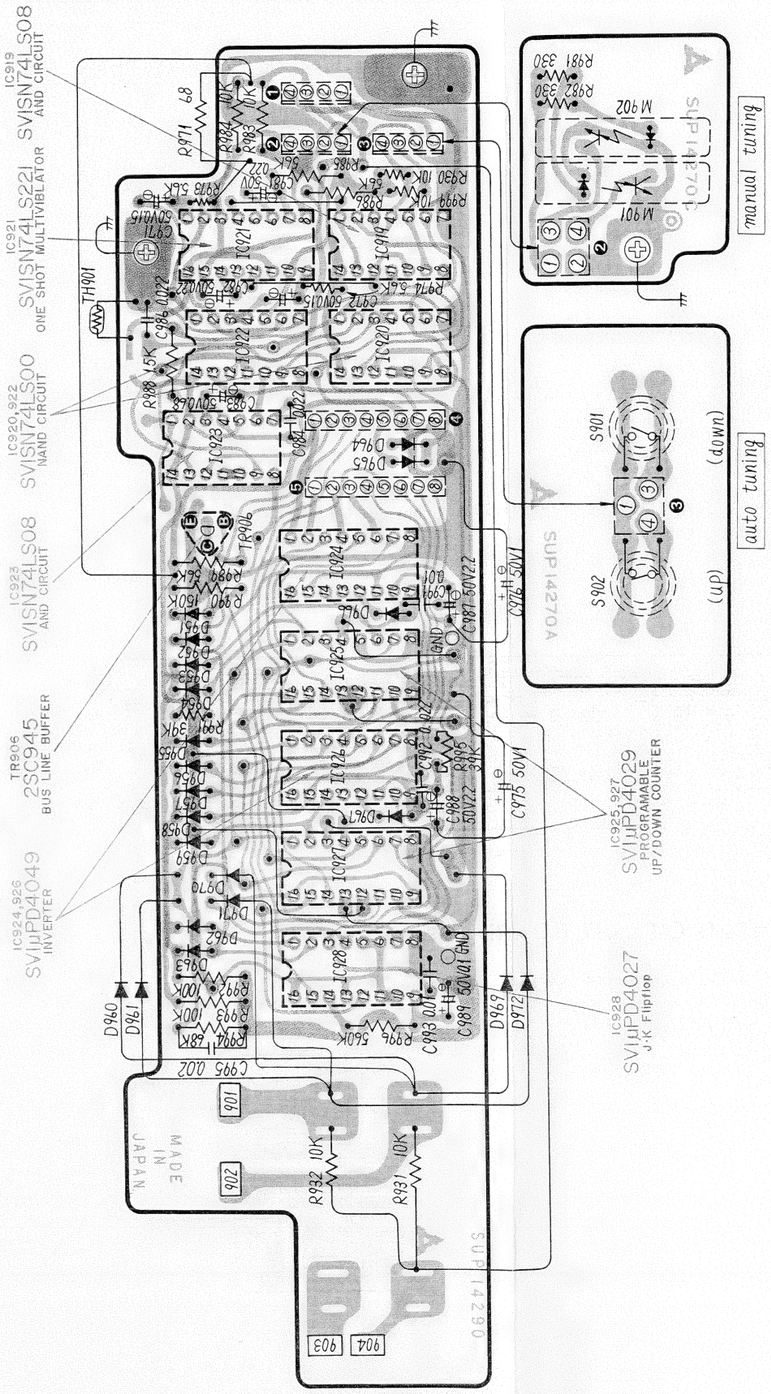
No.1

Ref. No.	Part No.	
R968	**ERD25TJ223**	
R969	**ERD25TJ103**	
R970	**ERD25TJ392**	
R972	**ERD25TJ472**	
R973, 974	**ERD25TJ103**	
R975, 976	**ERD25TJ223**	
R978	**ERD25TJ103**	
R979	**ERD25TJ563**	
R981, 982	**ERD25TJ153**	
R983, 984	**ERD25TJ391**	
R985, 986	**ERD25TJ273**	
R988	**ERD25TJ102**	
R989	**ERD25TJ272**	
R990	**ERD25TJ681**	
R991	**ERD25TJ102**	
R992, 993	**ERD25TJ332**	
R994	**ERD25TJ683**	
R995	**ERD25TJ103**	
R996	**ERD25TJ682**	
R997	**ERD25TJ334**	
R999	**ERD25TJ562**	
	CAPACITORS	
C1	ECKD1H223ZF	
C2	ECKD1H223ZF	
C3	ECKD1H223ZF	
C4	ECKD1H223ZF	
C5, 6	ECKD1H223ZF	
C7	ECKD1H223ZF	
C8	ECKD1H223ZF	
C10	ECKD1H223ZF	
C11	ECKD1H223ZF	
C12	ECKD1H223ZF	
C13	ECKD1H223ZF	
C14	ECKD1H223ZF	
C15	ECKD1H223ZF	
C16	ECKD1H223ZF	
C17	ECKD1H223ZF	
C18	ECKD1H223ZF	
C19	ECKD1H223ZF	
C20	ECKD1H223ZF	
C21	ECKD1H223ZF	
C22	ECKD1H223ZF	
C23	ECKD1H223ZF	
C25	ECKD1H223ZF	
C26, 27	ECKD1H223ZF	
C28	ECKD1H223ZF	
C29, 30	ECKD1H223ZF	
C31	ECKD1H223ZF	
C101	ECKD1H223ZF	
C102, 103	ECKD1H223ZF	
C104	ECKD1H223ZF	
C105	**ECEA1ES470**	
C106, 107	ECKD1H223ZF	
C108, 109	ECKD1H223ZF	
C110, 111	ECKD1H223ZF	

■ PRINTED CIRCUIT BOARD ..... Counter Clock Circuitry

Circuit view on top of P.C.B.

Circuit view on bottom of P.C.B.

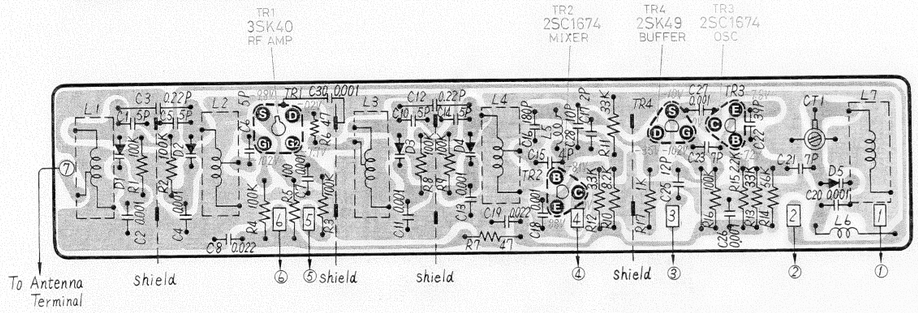


■ TERMINAL GUIDE

2SA733 , 2SC829 2SC945 , 2SC1384 2SC1674	2SK49 2SK104	3SK40	2SD571	2SA913 2SC1913
SVISN74185 SVISN74LS47 SVISN74LS76 SVISN74LS192 SVISN74LS221 SVIμPD4027C SVIμPD4029C SVIMC10131P AN377, AN363	SVIμPC4558C	SVISN7406 SVISN74LS00 SVISN74LS03 SVISN74LS08 SVISN74LS32 SVISN74LS74		MA320G1-N
	AN278	SVIμPD861C		

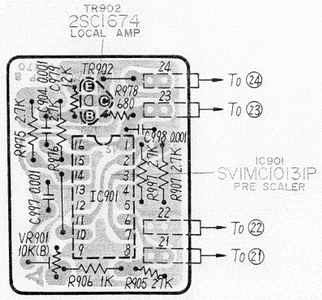
■ PRINTED CIRCUT BOARD... Front End Circuitry

Earth (Ground) Lines



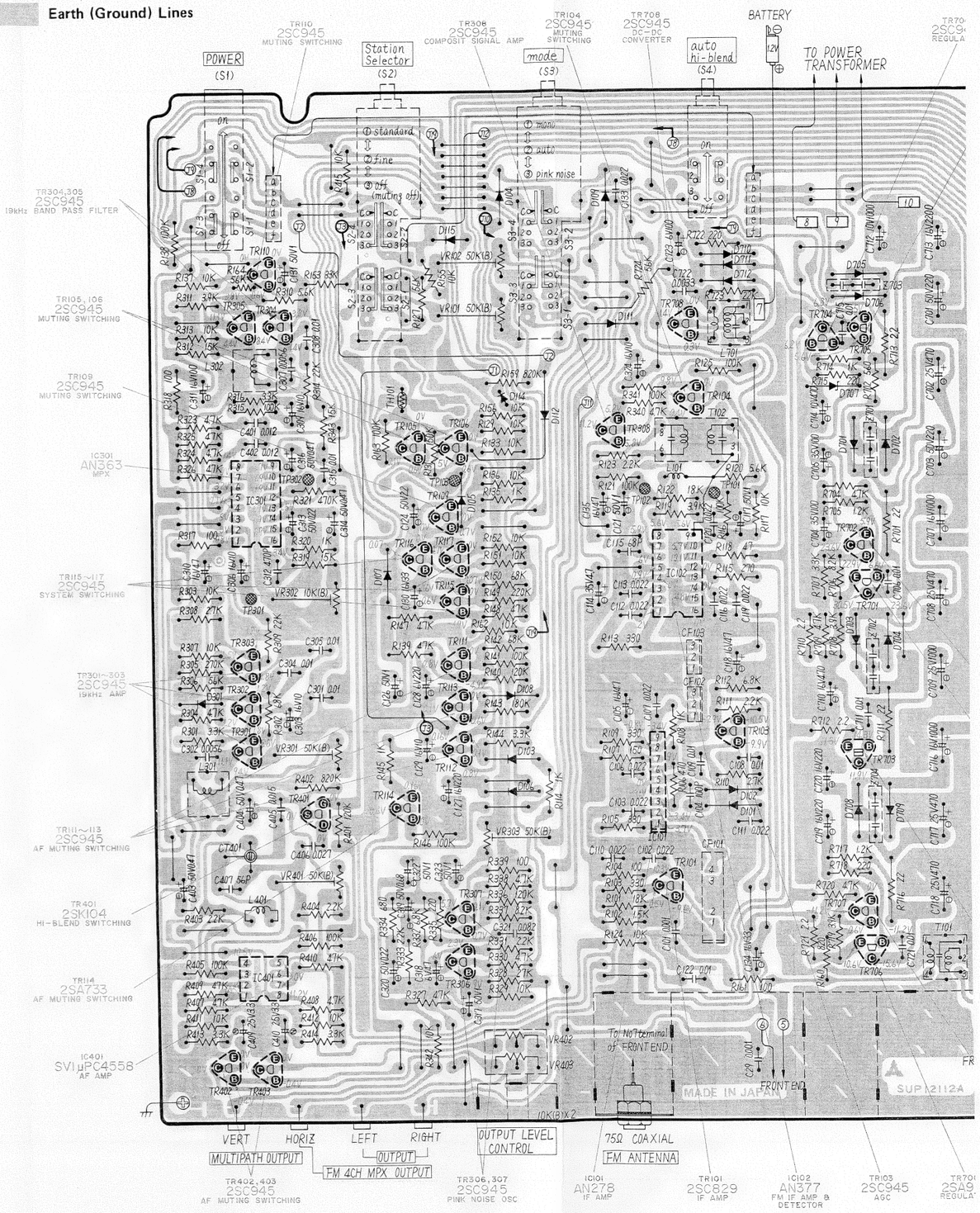
■ PRINTED CIRCUIT BOARD ... Pre Scaler Circuitry

Earth (Ground) Lines



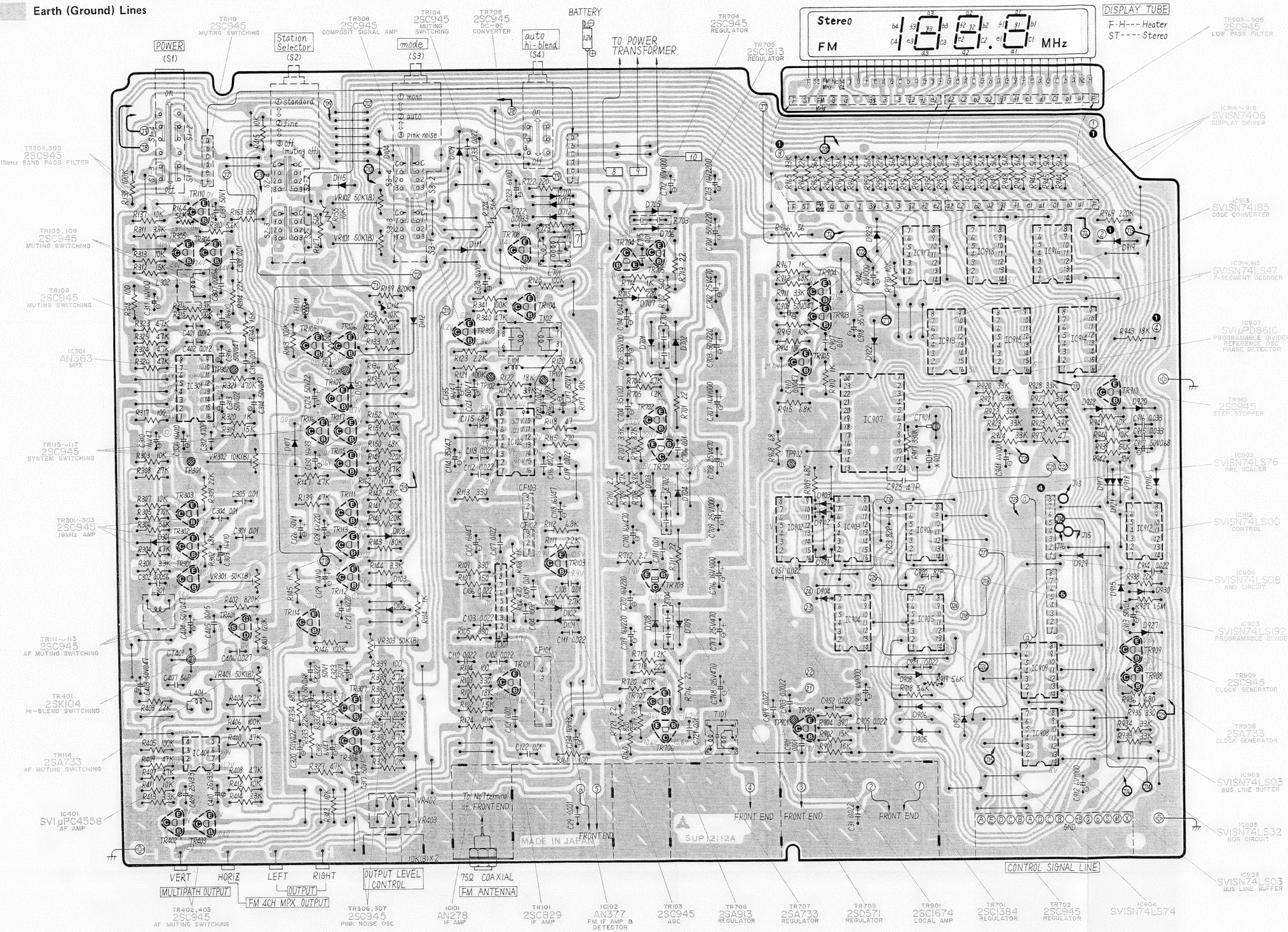
■ PRINTED CIRCUIT BOARD ... Power supply, Tuner, Programmable & Display circuitry

Earth (Ground) Lines



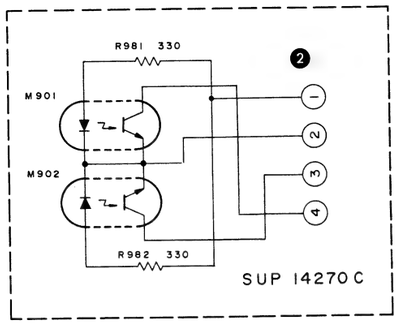
■ PRINTED CIRCUIT BOARD ... Power supply, Tuner, Programmable & Display circuitry

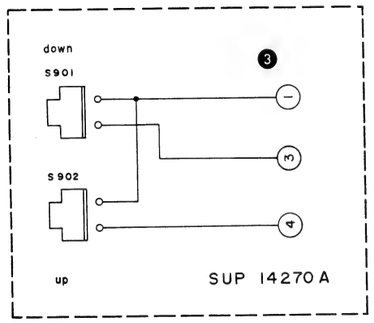
Earth (Ground) Lines



Schematic Diagram .....Ⓐ

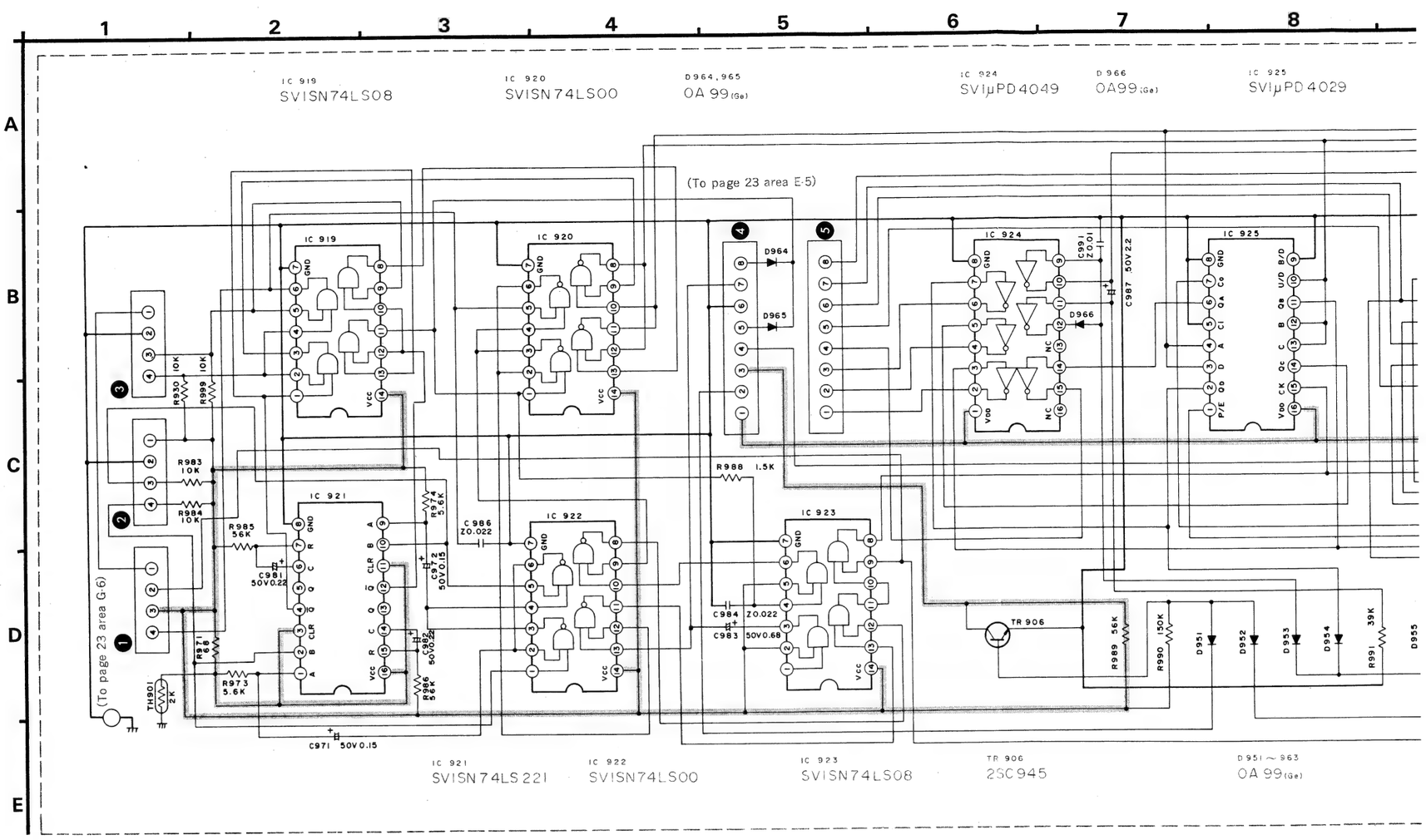
(Counter clock circuitry)





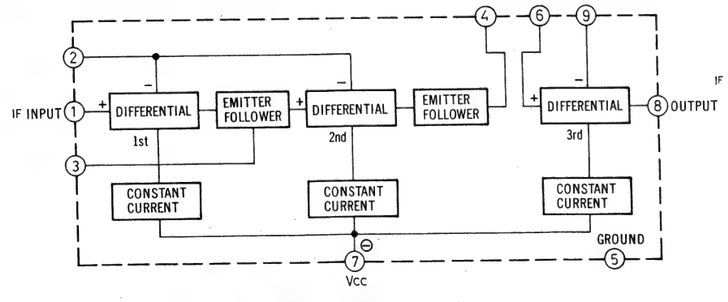
Note : Pluse power supply line

* This schematic diagram may be modified at any time with the development of new technology.

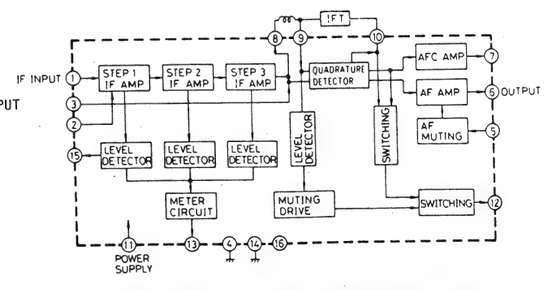


■ BLOCK DIAGRAM OF IC

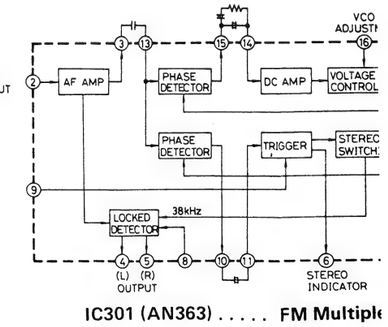
This is the basic block diagram of the inside circuit of IC. In an actual circuit, there may be sometimes idle terminals or some different functions other than the basic circuit.



IC101 (AN278) FM IF Amplifier



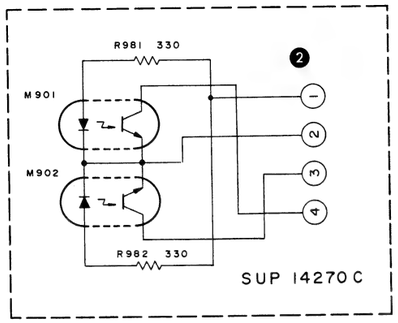
IC102 (AN377) FM IF Amplifier & Detector

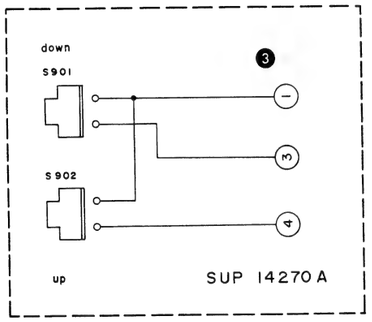


IC301 (AN363) ..... FM Multiple

Schematic Diagram .....Ⓐ

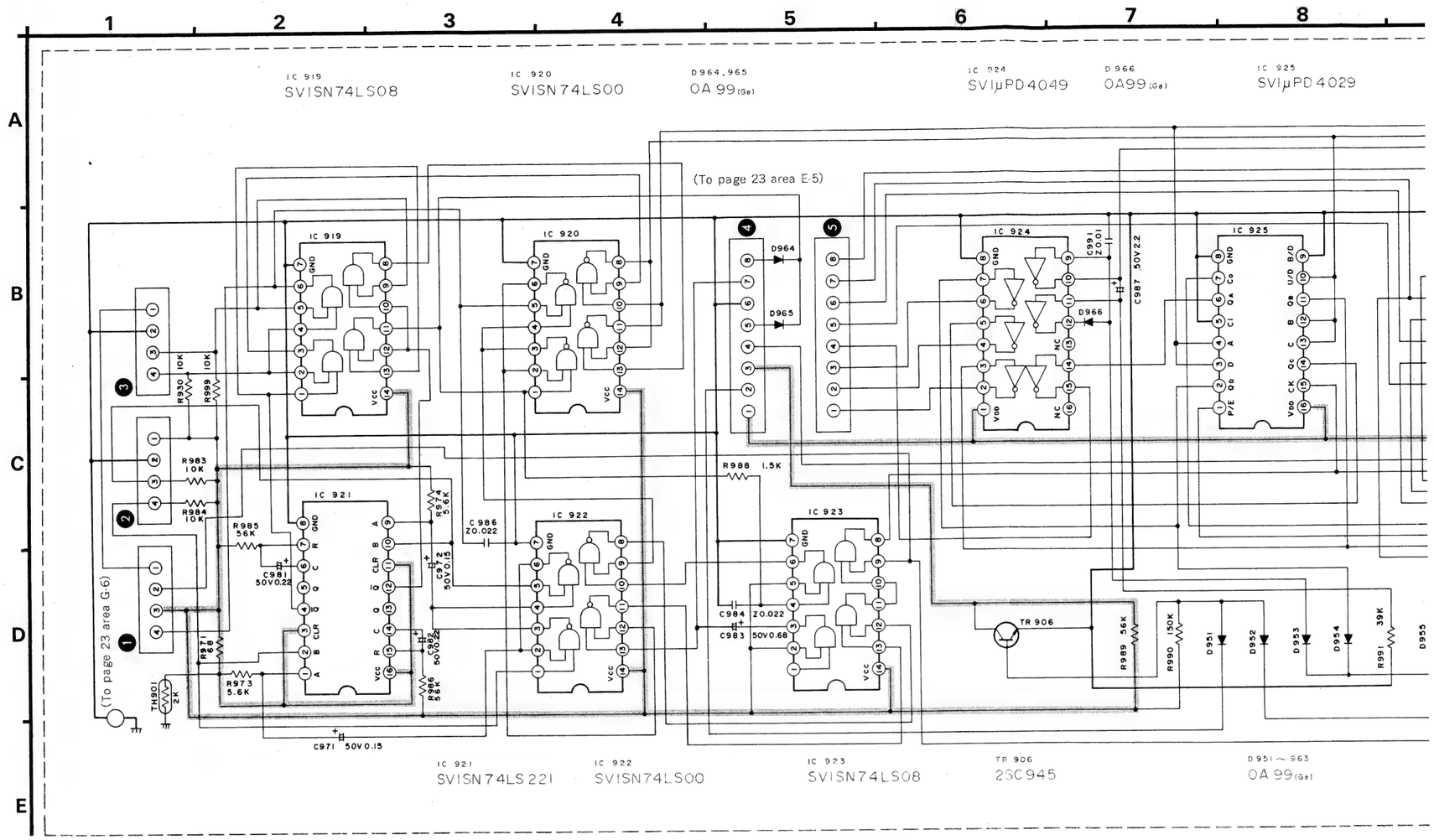
(Counter clock circuitry)





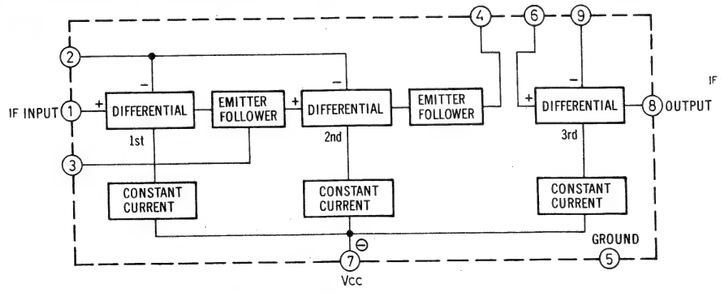
Note : Pluse power supply line

* This schematic diagram may be modified at any time with the development of new technology.

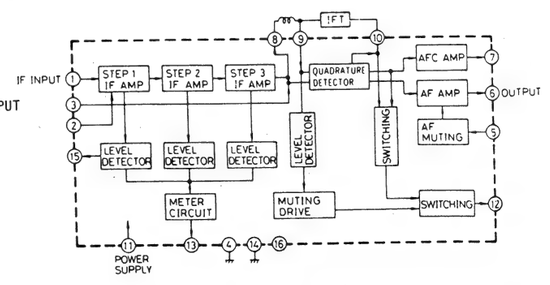


■ BLOCK DIAGRAM OF IC

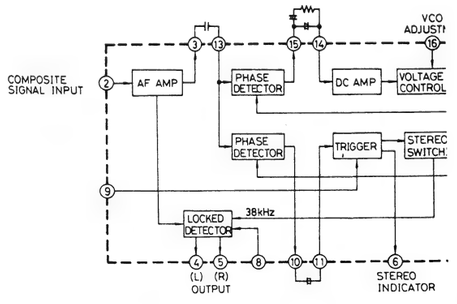
This is the basic block diagram of the inside circuit of IC. In an actual circuit, there may be sometimes idle terminals or some different functions other than the basic circuit.



IC101 (AN278) FM IF Amplifier



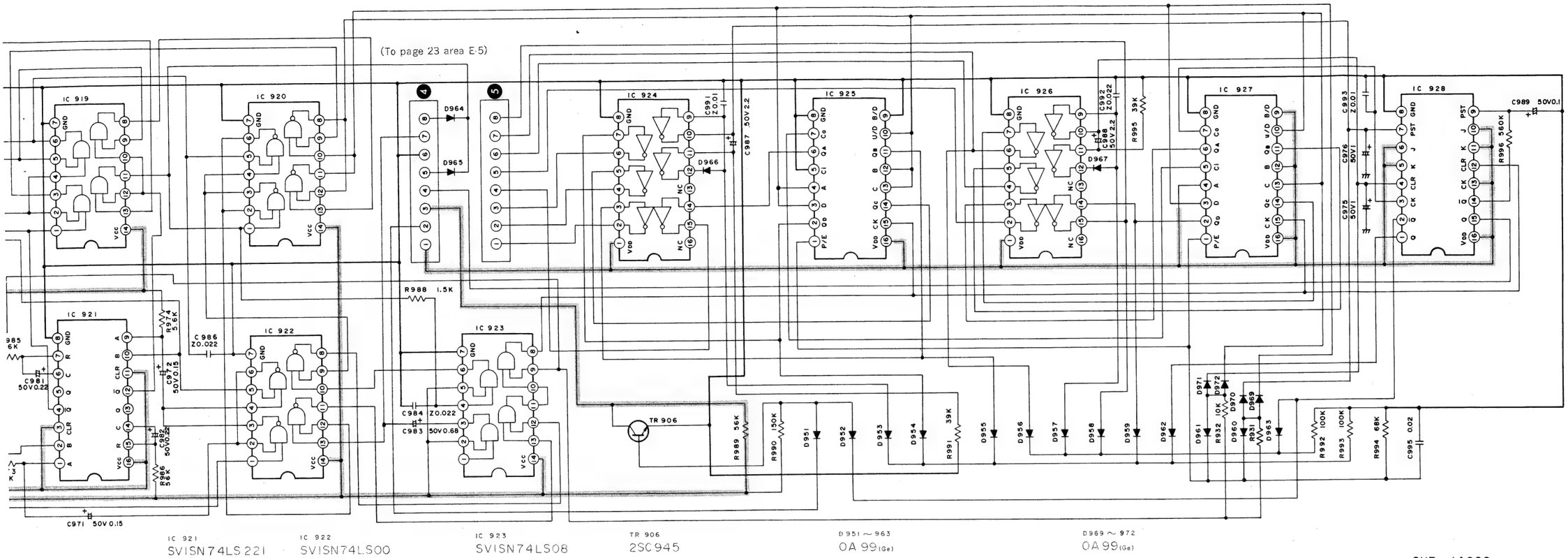
IC102 (AN377) FM IF Amplifier & Detector



IC301 (AN363) ..... FM Multiple

2 3 4 5 6 7 8 9 10 11 12 13

IC 919 SVISN74LS08 | IC 920 SVISN74LS00 | D964,965 OA 99(Ge) | IC 924 SVIμPD4049 | D966 OA99(Ge) | IC 925 SVIμPD4029 | IC 926 SVIμPD4049 | D967 OA 99(Ge) | IC 927 SVIμPD4029 | IC 928 SVIμPD4027

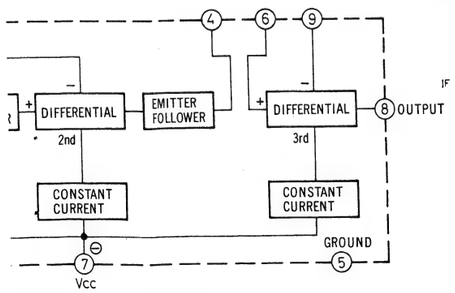


IC 921 SVISN74LS221 | IC 922 SVISN74LS00 | IC 923 SVISN74LS08 | TR 906 2SC945 | D951～963 OA 99(Ge) | D969～972 OA 99(Ge)

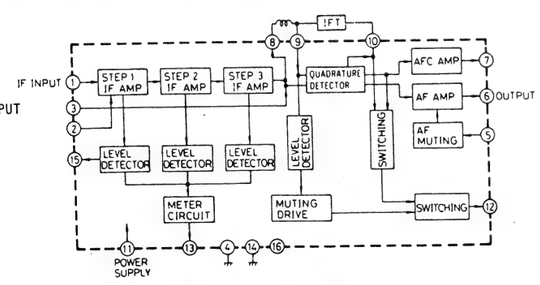
SUP 14290

OF IC

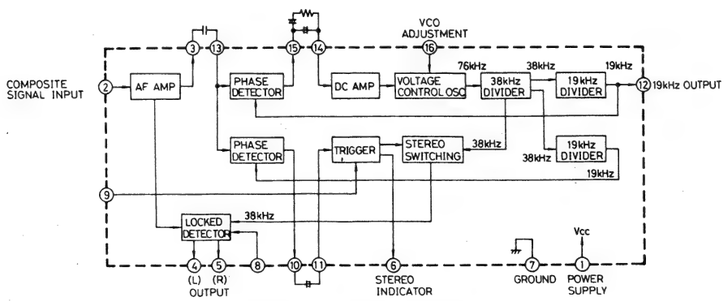
This is the basic block diagram of the inside circuit of IC. In an actual circuit, there may be sometimes idle terminals or some different functions other than the basic circuit.



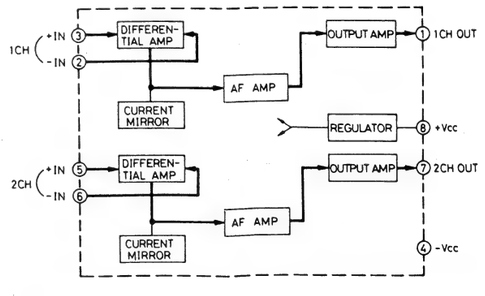
278) FM IF Amplifier



IC102 (AN377) FM IF Amplifier & Detector



IC301 (AN363) ..... FM Multiplex



IC401 (SVIμPC4558) 2CHANNEL AF AMPLIFIER

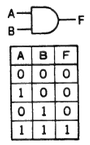
Schematic Diagram .....Ⓑ

(Programmable & display circuitry)

Notes:

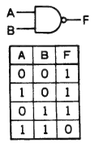
1. **S1-1 ~S1-4:** Power secondary switch in "stand-by" position.
   stand-by⟶on
2. **S2-1 ~S2-4:** Station selector switch in "off (muting off)" position.
   ① standard (muting on)⟶② fine (muting on)⟶
   ③ off (muting off)
3. **S3-1 ~S3-4:** Mode switch in "mono" position.
   ① mono⟶②auto⟶③pink noise
4. **S4:** Auto hi-blend switch in "on" position.
   on ⟷ off
5. **S701:** Voltage adjuster switch in **"240V"** position.
   ① 240V⟶②220V⟶③120V⟶④110V
6. **S702:** Power switch in **"OFF"** position.
   (The Product for United Kingdom [XE] only.)
7. **S901:** Auto tuning (down) switch.
8. **S902:** Auto tuning (up) switch.
9. Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high impedance) with the chassis taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
   - ▭ Monaural signal reception
   - ‹ › Stereo signal reception
   - ⌜ ⌟ Not apply signal to set
10. During scanning, 5V pulse wave form can be obtained at each IC terminal of clock count circuit and digital indication circuit.
11. The voltage at IC102 pin 13 varies depending on the input signal level, while the voltage of TR903 ~ 905 depending on the frequency received.
12. Signal Lines
    - ⇨ FM Signal
    - ⇢ FM-IF Signal
    - ⇨ AF Signal
    - ⇨ Pilot Signal
13. **S** indicates that only parts specified by the manufacturer be used for safety.

AND Circuit



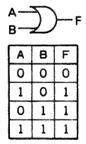
A	B	F
0	0	0
1	0	0
0	1	0
1	1	1

NAND Circuit



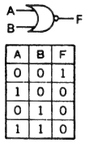
A	B	F
0	0	1
1	0	1
0	1	1
1	1	0

OR Circuit



A	B	F
0	0	0
1	0	1
0	1	1
1	1	1

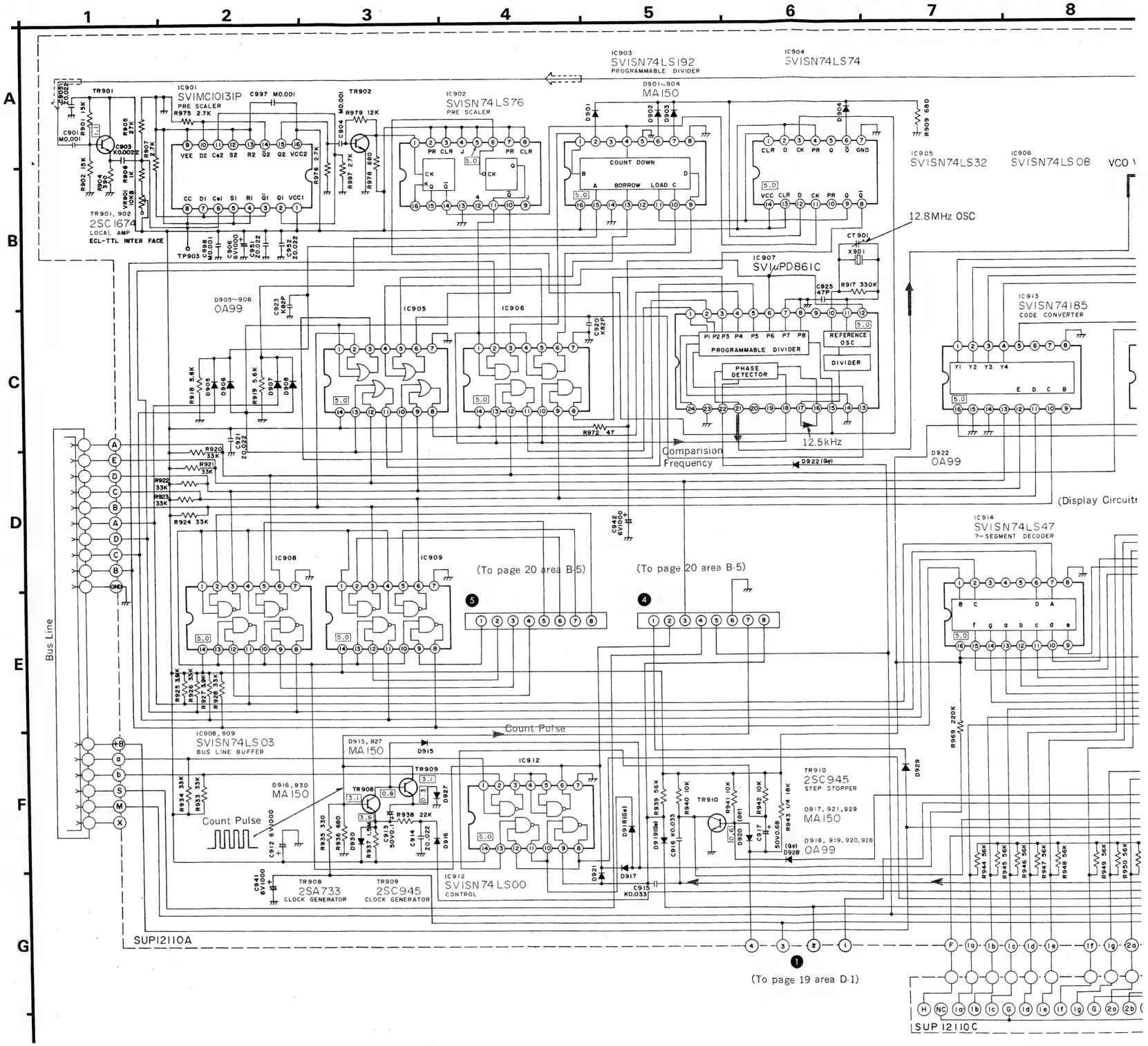
NOR Circuit



A	B	F
0	0	1
1	0	0
0	1	0
1	1	0

NOT Circuit

*** This schematic diagram may be modified at any time with the development of new technology.**



2 3 4 5 6 7 8 9 10 11 12

IC903 SVISN74LS192 PROGRAMMABLE DIVIDER

IC904 SVISN74LS74

IC902 SVISN74LS76 PRE SCALER

D901~904 MA150

IC905 SVISN74LS32

IC906 SVISN74LS08

TR903, 904, 905 2SC945 LOW PASS FILTER

VCO Voltage

OSC Signal

VCO Voltage

−10.5V Line

AC LINE 110/120/220/240V (50/60Hz)

12.8MHz OSC

IC907 SVIμPD861C

PROGRAMMABLE DIVIDER

PHASE DETECTOR

REFERENCE OSC

DIVIDER

12.5kHz

Comparision Frequency

D905~908 0A99

IC913 SVISN74185 CODE CONVERTER

IC915 SVISN74LS47 7−SEGMENT DECODER

IC917 SVISN74 DRIVER

D922 0A99

(Display Circuitry)

IC914 SVISN74LS47 7−SEGMENT DECODER

IC916 SVISN7406 DRIVER

IC918 SVISN7406 DRIVER

IC908

IC909

(To page 20 area B-5)

(To page 20 area B-5)

IC908,909 SVISN74LS03 2 LINE BUFFER

Count Pulse

D915, 927 MA150

IC912

D916, 930 MA150

Count Pulse

TR908 2SA733 CLOCK GENERATOR

TR909 2SC945 CLOCK GENERATOR

IC912 SVISN74LS00 CONTROL

TR910 2SC945 STEP STOPPER

D917, 921, 929 MA150

D918, 919, 920, 928 0A99

D923 MA150

Stereo Display 5V Line

SUP12110C

DISPLAY

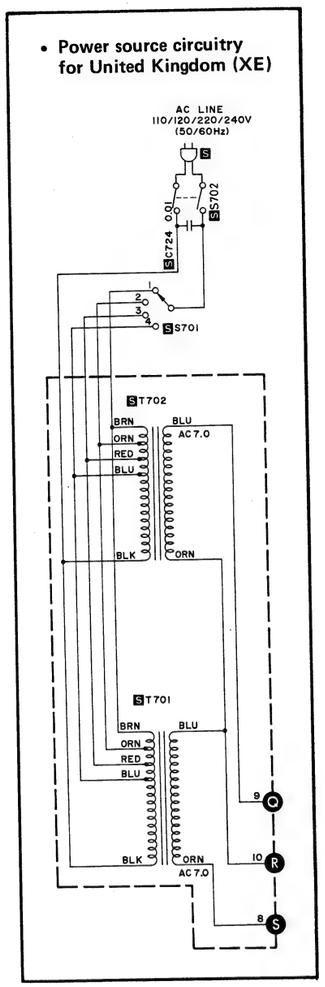
(To page 19 area D-1)

23 24

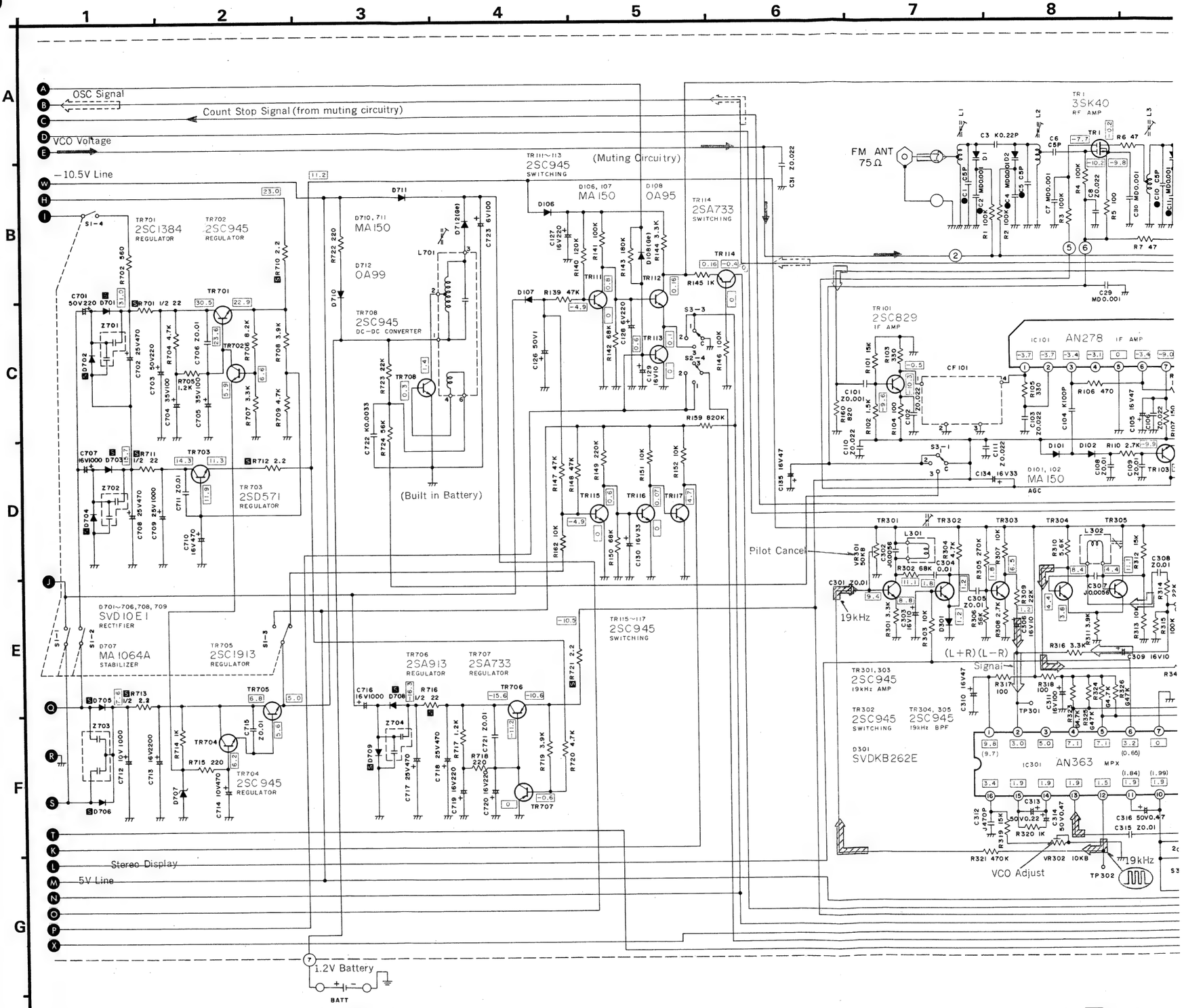
Schematic Diagram .....©

(Tuner circuitry & power supply circuitry)

- **Power source circuitry for United Kingdom (XE)**



* **This schematic diagram may be modified at any time with the development of new technology.**



3 4 5 6 7 8 9 10 11 12 13

FRONT END
(SUP12090)

Signal (from muting circuitry)

(Muting Circuitry)

FM ANT 75Ω

TR1 3SK40 RF AMP

TR2 2SC1674 MIXER

D1~5 MA320G1-N

TR3 2SC1674 LOCAL OSC

TR4 2SK49 BUFFER

D103 MA150

OSC Signal (to mixer circuitry)

IF Signal

OSC Signal

TR101 2SC829 IF AMP

IC101 AN278 IF AMP

CF101 CF102 CF103

IC102 AN377 IF, DET

Composite Signal

TP102 TP101

TR103 2SC945 AGC

D101, 102 MA150 AGC

Count Stop Signal

(L+R)(L-R) Pilot

TR111~113 2SC945 SWITCHING

D106, 107 MA150

D108 0A95

TR114 2SA733 SWITCHING

D710, 711 MA150

D712 0A99

TR708 2SC945 DC-DC CONVERTER

(Built in Battery)

TR115~117 2SC945 SWITCHING

TR706 2SA913 REGULATOR

TR707 2SA733 REGULATOR

Pilot Cancel

19kHz

(L+R)(L-R) Signal

TR301, 303 2SC945 19kHz AMP

TR302 2SC945 SWITCHING

TR304, 305 2SC945 19kHz BPF

D301 SVDKB262E

IC301 AN363 MPX

VCO Adjust

TP302

19kHz

19kHz Pilot

Pink Noise

Pink Noise Output Level

TR306, 307 2SC945 PINK NOISE

TR308 2SC945 AMP

Scan Stop Adjust

Sub Carrier Cancel

Separation

TR401 2SK104 SWITCHING

IC401 SVI/μPC4558 AF AMP

TR402, 403 2SC945 SWITCHING

TR104~106, 109, 110 2SC945 SWITCHING

D109, 114, 115 MA150 SWITCHING

D104, 105, 111, 112, 0A99(Ge) SWITCHING

OUTPUT L

OUTPUT R

FM 4CH MPX OUT (HOR)

FM MULTIPATH OUT (VERT)

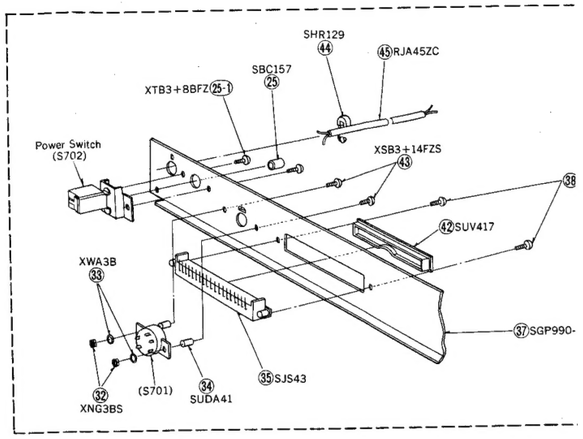
1.2V Battery

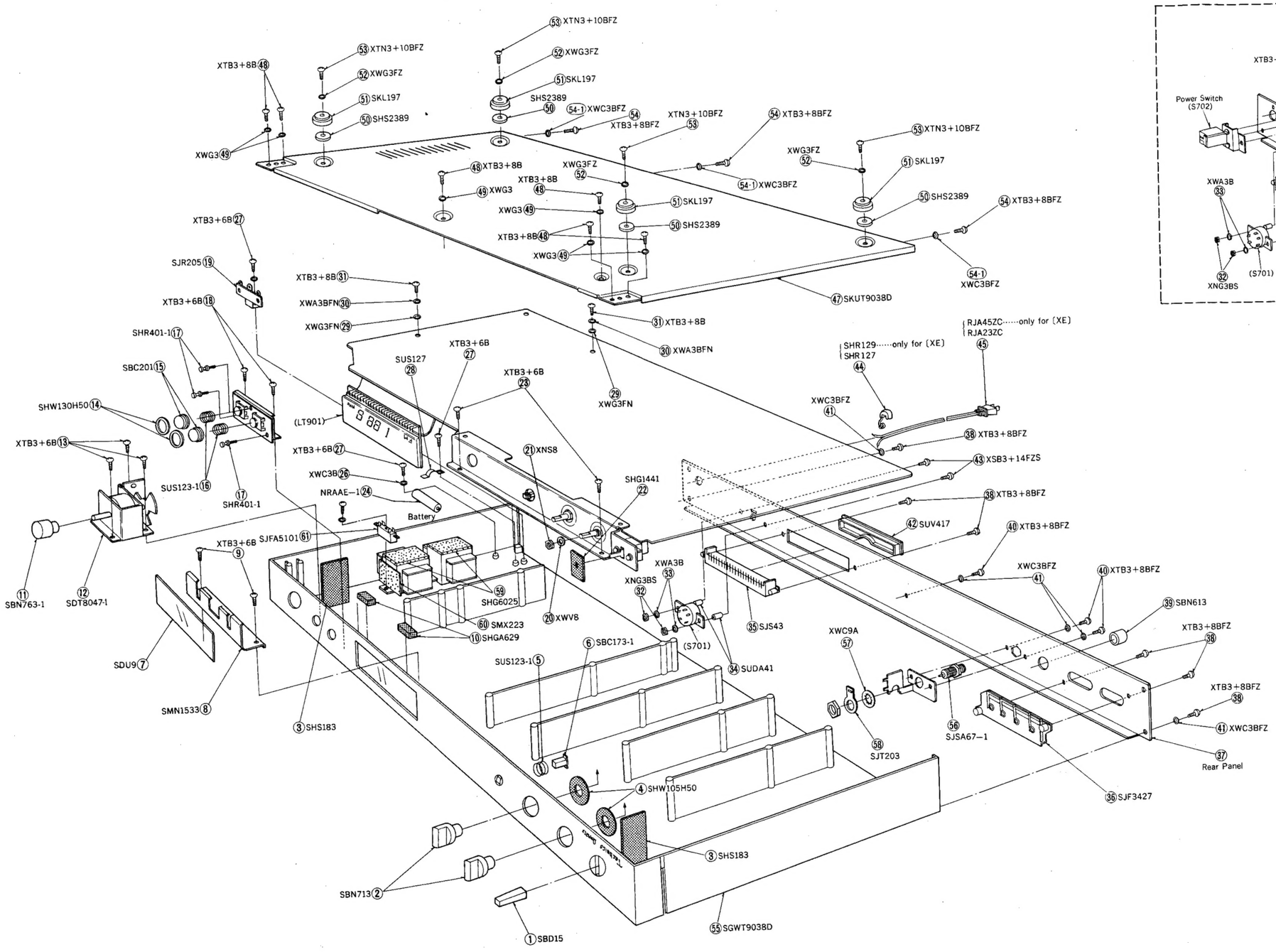
BATT

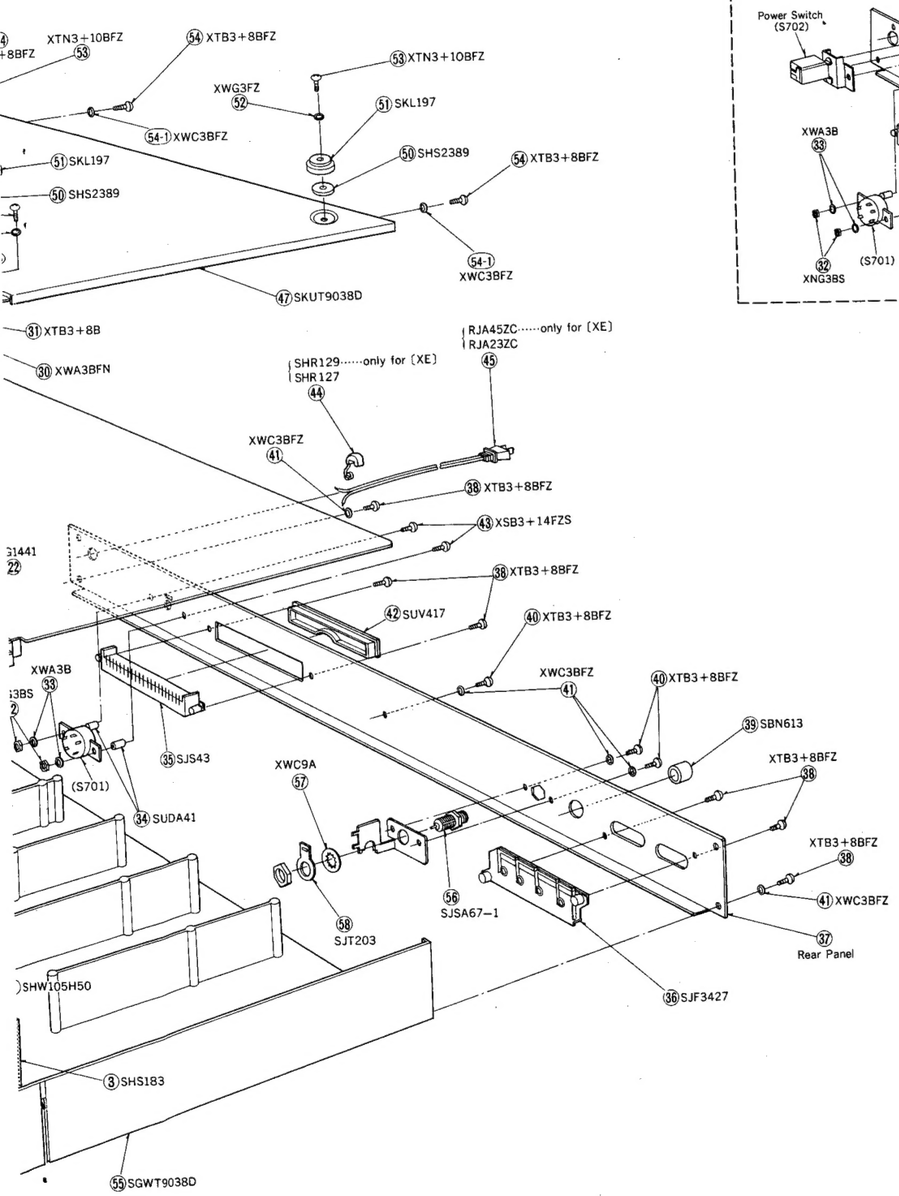
SUP12112A

■ EXPLODED VIEWS

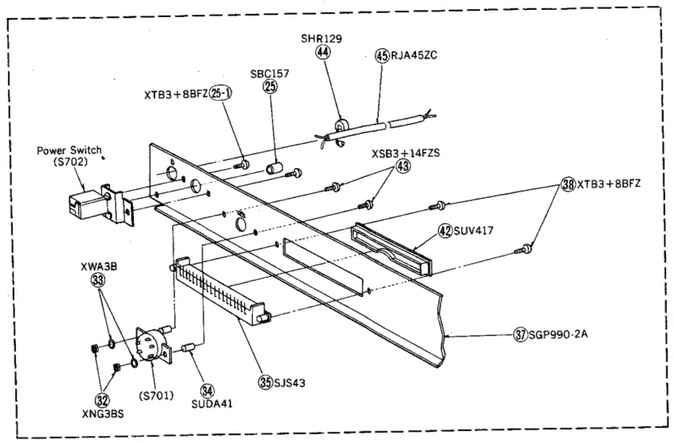
- **Rear panel parts of product for United Kingdom (XE)**







- **Rear panel parts of product for United Kingdom (XE)**



■ REPLACEMENT PARTS LIST

NOTES 1:
1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. **S** indicates that only parts specified by the manufacturer be used for safety.

Ref. No.		Part No.	Part Name & Description	Per Set		Remarks
			CABINET and CHASSIS PARTS			
1		SBD15	Knob, Power Switch	1		
2		SBN713	Knob, Station Selector and Mode Switch	2		
3		SHS183	Shading Cloth	2		
4		SHW105H50	Shading Cloth, Station Selector and Mode Switch	2		
5		SUS123-1	Spring, Auto Hi-Blend	1		
6		SBC173-1	Button Auto Hi-Blend	1		
7		SDU9	Filter, Tinted Plate	1		
8		SMN1533	Bracket, Frequency Display	1		*○
9		XTB3+6B	Screw, Frequency Display Bracket M'tg	2		
10		SHGA629	Rubber Cushion, Frequency Dispaly	2		
11		SBN763-1	Knob, Manual Tuning	1		○
12		SDT8047-1	Shaft, Tuning Ass'y	1		*○
13		XTB3+6B	Screw, Tuning Shaft Ass'y M'tg	3		
14		SHW130H50	Shading Cloth	2		○
15		SBC201	Button, Automatic-Tuning Switch	2		○
16		SUS123-1	Spring, Automatic-Tuning Switch Button	2		
17		SHR401-1	Latch, Automatic-Tuning Switch	3		
18		XTB3+6B	Screw, Automatic-Tuning Bracket M'tg	2		
19		SJR205	Terminal Strip, 2P (Except set for [XE])	1		
20		XWV8	Washer, Station Selector and Mode Switch	2		
21		XNS8	Nut, Station Selector and Mode Switch M'tg	2		
22		SHG1441	Shading Cloth, Power Switch	1		
23		XTB3+6B	Screw, Printed Circuit Board Ass'y M'tg	2		
24		NRAAE-1	Battery	1		
25 [XE] only		SBC157	Button, Power Switch	1		
25-1 [XE] only		XTB3+8BFZ	Screw, Power Switch M'tg	2		
26		XWC3B	Washer, Battery Spring Screw	1		
27		XTB3+6B	Screw, Terminal Strip and Battery Bracket M'tg	5		
28		SUS127	Bracket, Battery	1		
29		XWG3FN	Washer, Printed Circuit Board Ass'y Screw	2		
30		XWA3BFN	Washer, Printed Circuit Board Ass'y Screw	2		
31		XTB3+8B	Screw, Printed Circuit Board Ass'y M'tg	2		
32		XNG3BS	Nut, Voltage Selector Switch M'tg	2		
33		XWA3B	Washer, Voltage Selector Switch Screw	2		
34		SUDA41	Spacer, Voltage Selector Switch	2		
35		SJS43	Terminal, Control Signal Line	1		
36		SJF3427	Terminal, Output	1		
37 [E] only		SGP990-1A	Rear Panel	1		○
37 [XE] only		SGP990-2A	Rear Panel	1		○
37		SGPT9038X	Rear Panel, SGP990-1A with Name Plate (SGT16810)	1		○
38		XTB3+8BFZ	Screw, Output Terminal, Signal Line Terminal and Rear Panel M'tg	6		
39		SBN613	Knob, Output Level	1		
40		XTB3+8BFZ	Screw, FM Antenna Terminal and Shield Cover M'tg	3		
41		XWC3BFZ	Washer, FM Antenna Terminal and Shield Cover Screw	5		
42		SUV417	Rubber Cap, Control Signal Line	1		*○
43		XSB3+14FZS	Screw, Voltage Selector Switch M'tg	2		
44		SHR127	Bushing, AC Cord (Except set for [XE])	1		
44 [XE] only		SHR129	Bushing, AC Cord	1		
45	S	RJA23ZC	AC Cord, Power Source (Except set for [XE])	1		
45 [XE] only	S	RJA45ZC	AC Cord, Power Source	1		*○
47		SKUT9038D	Bottom Board	1		
48		XTB3+8B	Screw, Bottom Board M'tg	6		
49		XWG3	Washer, Bottom Board Screw	6		
50		SHS2389	Spacer, Foot	4		
51		SKL197	Foot, Set	4		
52		XWG3FZ	Washer, Set Foot Screw	4		
53		XTN3+10BFZ	Screw, Set Foot M'tg	4		
54		XTB3+8BFZ	Screw, Bottom Board M'tg	3		
54-1		XWC3BFZ	Washer	3		
55		SGWT9038D	Cabnet Ass'y	1		○
56		SJSA67-1	Terminal, Antenna (Coaxial), with Nut	1		
57		XWC9A	Washer	1		
58		SJT203	Terminal, Earth Lug	1		
59		SHG6025	Rubber Cushion, Power Transformer	4		
60		SMX223	Sever Plate	1		
61 (E, XGH, XGF X, XA		SJFA5101	Holder, Fuse (F1)	1		
			(The product for [XE] is not provided.)			

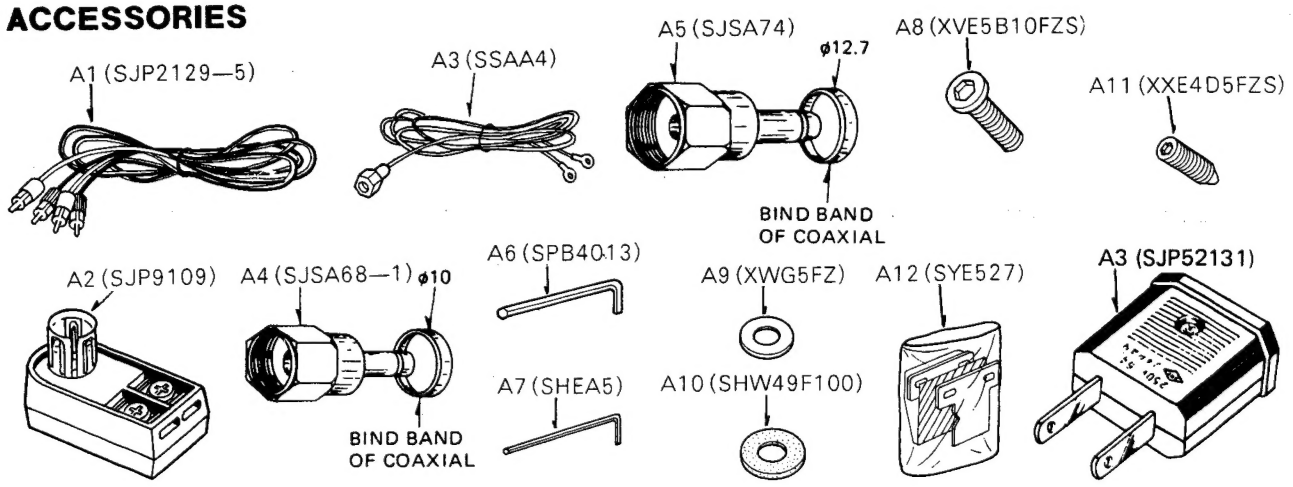
■ CHANGE FROM TENTATIVE SERVICE MANUAL

Ref. No.	Change of Part No. (Tentative) OLD ➡ NEW		Part Name & Description	Per Set		Remarks
FUSE						
F1 (E, XGF, XGH, X, CA)	———	XBA2C06TR0	Fuse, T630mA (250V) (The product for [XE] is not provided.)	1		
CABINET and CHASSIS PARTS						
12	SDT8047	SDT8047-1	Shaft, Tuning Ass'y	1		○
59	———	SHG6025	Rubber Cushion, Power Transformer	4		
60	———	SMX223	Sever Plate	1		
61 (E, XGH, XGF, X, XA)	———	SJFA5101	Holder, Fuse (F1) (The product for [XE] is not provided.)	1		
PACKING PARTS						
P5	SQF1927	SQF1927-2	Instructions Book, Printed Matter	1		○
P5 [XE] only	SQF1971	SQF1971-2	Instructions Book, Printed Matter	1		○

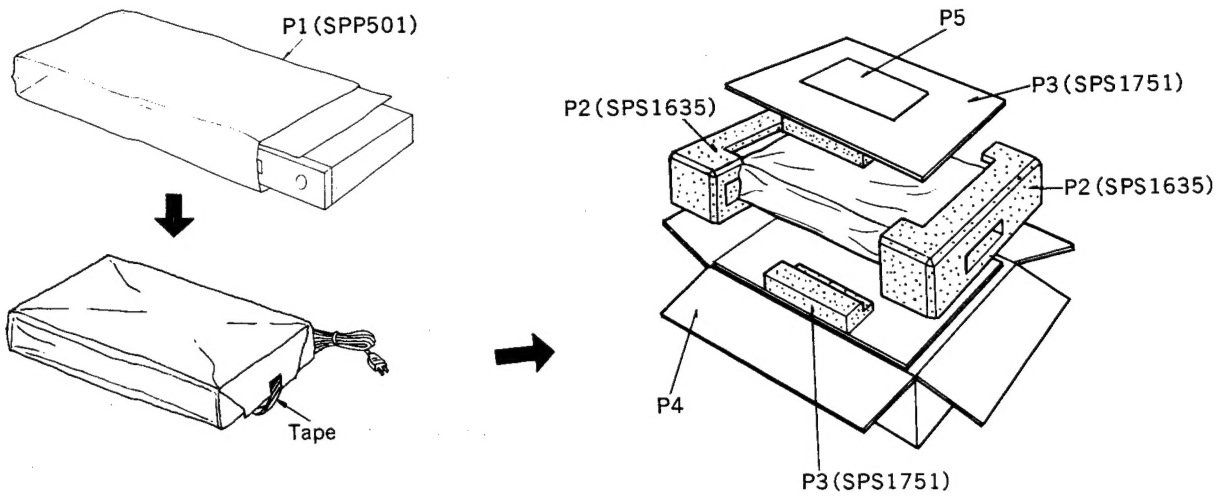
Ref. No.		Part No.	Part Name & Description	Per Set		Remarks
ACCESSORIES						
A1		SJP2129-5	Cord, Connection Shield	1		
A2		SJP9109	Plug Adapter, Antenna Impedance Change 300Ω ⟷ 75Ω	1		
A3		SSAA4	Cord, FM Indoor Antenna	1		
A4		SJSA68-1	Plug, Coaxial (with Bind Band) for "3C-2V"	1		
A5		SJSA74	Plug, Coaxial (with Bind Band) for "5C-2V"	1		
A6		SPB4013	Screw Driver, 4mm Hexagonal Wrench	1		
A7		SHEA5	Screw Driver, 2mm Hexagonal Wrench	1		
A8		XVE5B10FZS	Bolt, 5mm Hexagonal Recessed Head	4		
A9		XWG5FZ	Washer, Metal	4		
A10		SHW49F100	Washer, Fiber	4		
A11		XXE4D5FZS	Screw, 4mm Hexagonal Recessed Head	2		
A12		SYE527	Mounting Adapter, Rack	1		
A13 [XA, X] only	S	SJP5213	Plug Adapter, AC Power	1		
PACKING PARTS						
P1		SPP501	Polyethylene Bag	1		
P2		SPS1635	Pad, Left and Right Side	2		
P3		SPS1751	Pad, Bottom & Top Side	2		
P4		SPG1465	Carton Box (Except set for [XGF])	1		○
P4 [XGF] only		SPG1467	Carton Box	1		○
P5		SQF1927-2	Instructions Book, Printed Matter (Except set for [XE])	1		○
P5 [XE] only		SQF1971-2	Instructions Book, Printed Matter	1		○

Notes:
* (E) is available in Scandinavia and European only.
* (XE) is available in United Kingdom only.
* (XGF) is available in France only.
* (XGH) is available in Holland only.
* (XA) and (X) are available in Asia, Latin America, Middle East and Africa only.

■ ACCESSORIES



■ PACKINGS



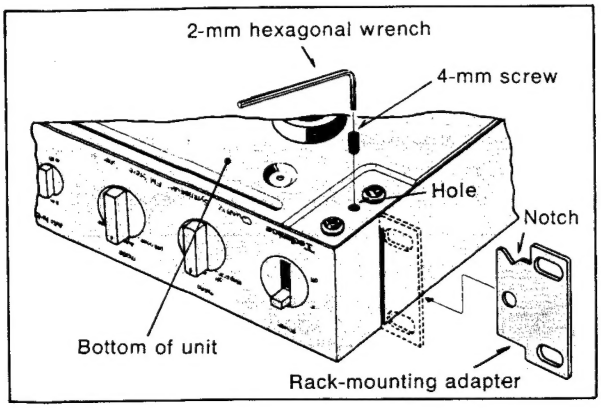
■ MOUNTING IN AN EIA-STANDARD RACK

When this unit is mounted in an EIA-standard rack, use the included rack-mounting adapters.

• ATTACHMENT OF RACK-MOUNTING ADAPTERS

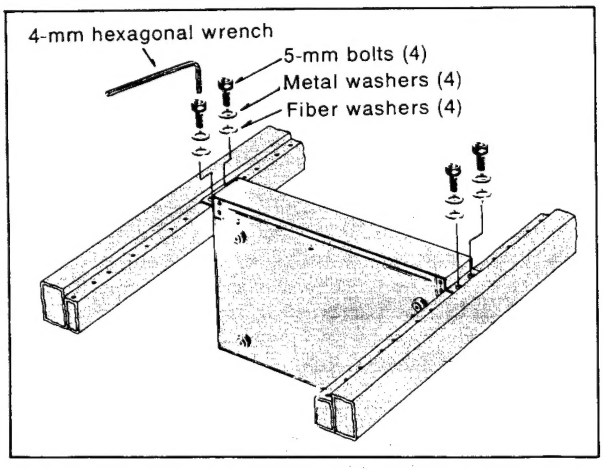
1) Insert the adapters into the sides of this unit, with the notched part of the adapter at the bottom.
2) Use the hexagonal wrench to tighten the 4-mm screws in order to secure the adapters in place.
(Left and right adapters are attached in the same way.)

Note:
Be sure the screws are not inserted beyond the unit surface.



• MOUNTING IN EIA-STANDARD RACK

Place a metal washer and fiber washer on each of the included 5 mm bolts, and use the hexagonal wrench to attach the unit to the rack as shown in the figure.



■ USE OF UNIT "FEET"

This unit is equipped with 2 groups of feet: one group higher than the other. (The lower feet are included within the higher ones.)
Remove the high feet and use the low ones when:

1) This unit and the Technics model SH-9038 (of the same series) are stacked together.
2) This unit is mounted in an audio rack and the high feet don't fit well.

■ Spaces between equipment when stacked:

- Using high feet . . . . . .9 mm
- Using low feet. . . . . .1 mm

Notes:

1. If this unit is mounted in an EIA-standard audio rack, use the included rack-mounting adapters.
2. If this unit is stacked with an integrated (pre/main) amplifier, or a power amplifier, be sure not to remove the high feet, because the radiated heat may adversely affect the operation of this unit.

Printed in Japan
78096800